

Carlsbad Municipal Water District

Master Plan Updates

VOLUME IV RECLAIMED WATER

October 1997



**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS

	<u>Page No.</u>
CHAPTER 1 - RECLAIMED WATER	1-1
1.1 Introduction	1-1
1.2 Past Master Plans	1-1
1.3 Existing Reclamation Program	1-2
1.4 Purpose and Scope	1-2
 CHAPTER 2 - SUMMARY AND RECOMMENDATIONS	 2-1
2.1 Phase I Program	2-1
2.2 Future Demands	2-1
2.3 Future Sources of Reclaimed Water	2-1
2.4 Alternative Development	2-2
2.5 Analysis Factors	2-2
2.6 Cost Analysis	2-5
2.7 Conclusions and Recommendations	2-5
 CHAPTER 3 - EXISTING RECLAMATION PROGRAM	 3-1
3.1 Past Studies	3-1
City of Carlsbad Water Reclamation Master Plan (1)	3-1
North County Water Reclamation Project - Phase II Master Plan (2)	3-1
3.2 District Ordinance	3-4
3.3 Phase I Project	3-4
3.4 Source of Reclaimed Water	3-5
Conveyance	3-5
Distribution	3-7
Existing Users	3-7
Historical Use	3-7
Seasonal Usage	3-9
3.5 La Costa Resort and Spa	3-9
3.6 Encina CALTRANS Irrigation	3-12
3.7 Phase I Costs	3-12
Project Costs	3-14
Annual Costs	3-14
Sources of Funds	3-15

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS
(Continued)

CHAPTER 4 - REGULATORY REQUIREMENTS	4-1
4.1 Introduction	4-1
4.2 State Requirements	4-1
State Department of Health Services (DHS)	4-1
Title 22 Requirements	4-1
San Diego Regional Water Quality Control Board (RWQCB)	4-5
Specific Waste Discharge Permit Requirements	4-14
4.3 Local Institutions and Requirements	4-17
California Coastal Commission and Local Coastal Program	4-17
San Diego County	4-18
 CHAPTER 5 - RECLAIMED WATER QUALITY CRITERIA AND TREATMENT	
REQUIREMENTS	5-1
5.1 Introduction	5-1
5.2 Effluent Quality	5-1
Gafner WRP Historical Effluent Quality Data	5-1
Meadowlark WRP Historical Quality Data	5-2
Effluent Quality Requirements per RWQCB	5-3
Comparison of Effluent Quality to RWQCB Requirements	5-4
Gafner WRP Comparison	5-4
Gafner WRP vs. Waste Discharge Permit Requirements	5-4
Meadowlark WRP Comparison	5-5
Meadowlark WRP vs. Waste Discharge Permit Requirements	5-5
Meadowlark WRP vs. RWQCB Groundwater Objectives	5-5
Encina Effluent Quality	5-6
TDS Variation	5-7
5.3 Use-Related Quality Limitations	5-9
Salinity	5-11
Percent Sodium, Sodium Adsorption Ratio and Adjusted Sodium Adsorption Ratio	5-12
Permeability	5-13
Specific Ion Toxicities	5-14
Sodium	5-14
Chloride	5-14
Boron	5-15
Bicarbonate	5-15
Nitrogen	5-15
Other Criteria	5-16
Comparison of Existing Effluent with Recommended Irrigation Parameters	5-17
Gafner WRP Effluent vs. Recommended Irrigation Criteria	5-17
Meadowlark WRP Effluent vs. Recommended Irrigation Criteria	5-18
Industrial Water Quality Criteria	5-19
Ecological Enhancement Water Quality Criteria	5-19

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS
(Continued)

CHAPTER 6 - PHASE II MARKET DEVELOPMENT	6-1
6.1 Introduction	6-1
6.2 Past Market Studies	6-1
6.3 Review of Past Markets	6-2
6.4 Phase II Potential Markets	6-2
Potential Users	6-2
Potential Market Size	6-2
 CHAPTER 7 - RECLAIMED WATER SOURCES	 7-1
7.1 Existing Reclamation Plants	7-1
7.2 Meadowlark Water Reclamation Plant	7-1
7.3 Shadowridge Water Reclamation Plant	7-2
7.4 Gafner Water Reclamation Plant	7-2
7.5 Failsafe Lines	7-2
7.6 Encina Water Pollution Control Facility	7-3
Description	7-3
Treatment Capacity	7-3
Solids Handling Capacity	7-3
Additional Property	7-4
7.7 Design Criteria	7-4
7.8 Storage	7-4
Mahr Reservoir	7-4
Lake Calavera	7-4
Santa Fe I	7-5
C Reservoir	7-5
7.9 County Water Authority	7-5
7.10 Ground Water	7-6
 Chapter 8 - ALTERNATIVE ANALYSIS	 8-1
8.1 Phase II Goals	8-1
8.2 Conceptual Reclaimed Water Sources	8-1
8.3 Seasonal Storage Reservoirs	8-2
8.4 Diurnal Storage Reservoirs	8-2
8.5 Meadowlark Water Reclamation	8-2
Meadowlark Expansion	8-3
Wastewater Pumping	8-3
8.6 Gafner Water Reclamation Plant	8-5
8.7 Shawdownridge Water Reclamation Plant	8-5
8.8 Proposed Encina Water Reclamation Plan	8-6
8.9 Process Description	8-6
8.10 Potential Demands	8-7
8.11 Quality Requirements	8-7
8.12 Alternative Development Criteria	8-9
8.13 Alternative Description	8-9
Alternative No. 1	8-10

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS

(Continued)

Alternative No. 2	8-11
Alternative No. 3	8-11
Alternative No. 4	8-12
Alternative No. 5	8-15
Alternative No. 6	8-16
Alternative No. 7	8-18
Alternative No. 8	8-18
Alternative No. 9	8-18
Alternative No. 10	8-18
8.14 Alternative Analysis	8-19
Basis of Costs	8-19
Cost Comparison	8-19
Purchase of Raw Imported Water	8-24
Comparison of Alternatives	8-25
Recommended Alternative	8-30

LIST OF ABBREVIATIONS

APPENDIX A - PROPOSED WASTEWATER RECLAMATION CRITERIA STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES

APPENDIX B - STATE WATER CODE

APPENDIX C - WATER QUALITY CRITERIA

APPENDIX D - EXISTING WATER RECLAMATION FOR LEUCADIA COUNTY WATER DISTRICT, VALLECITOS WATER DISTRICT

APPENDIX E - EXISTING WATER RECLAMATION PLANT DESIGN CRITERIA AND PROCESS SCHEMATICS

LIST OF REFERENCES

LIST OF TABLES

2.1 Reclamation Alternatives	2-4
2.2 Reclaimed Cost Comparison	2-6
3.1 Existing Water Reclamation Reports and Studies	3-2
3.2 Phase I Users Identified in Application for Encina Basin Project	3-5
3.3 Existing Users	3-8
3.4 Historical Reclaimed Water Use	3-9
3.5 Purchases from Gafner WRP	3-13
3.6 Phase I Project Costs	3-14
3.7 Cost/Revenue Summary	3-16

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS

(Continued)

4.1	Title 22 Reclamation Requirements Required Degree of Treatment for Reclaimed Water	4-2
4.2	Title 22 Reclaimed Water Quality Requirements for Unrestricted Recreational Use	4-3
4.3	Proposed Wastewater Reclamation Criteria for Disinfected Tertiary Reclaimed Water	4-5
4.4	Basin Plan Groundwater Quality Objectives, Watersheds within the CMWD Study Area	4-10
4.5	Waste Discharge Permit Requirements for Gafner and Meadowlark WRPs	4-15
5.1	Forest R. Gafner Water Reclamation Plant, Historical Quality Compliance Data	5-1
5.2	Meadowlark Water Reclamation Plant, Historical Quality Compliance Data	5-2
5.3	Meadowlark and Gafner Reclamation, Discharge Permit Requirements	5-3
5.4	Comparison of Gafner Data to Permit Requirements	5-4
5.5	Comparison of Gafner WRP Data to RWQCB Water Quality Objectives	5-5
5.6	Comparison of Meadowlark WRP Data with WDR Permit Requirements	5-5
5.7	Comparison of Meadowlark WRP Data with RWQCB Groundwater Objectives	5-6
5.8	EWPCF Annual Average TDS Values (mg/L)	5-7
5.9	Guidelines for Irrigation With Reclaimed Water	5-9
5.10	Salinity, Boron, and Chloride, Nitrogen, and SAR Tolerance Levels for Major San Diego Crops	5-10
5.11	McKee and Wolf Classification of Irrigation Waters	5-12
5.12	Guidelines for Trace Elements in Irrigation Water	5-16
5.13	Comparison of Gafner WRP with Recommended Irrigation Criteria	5-17
5.14	Comparison of Meadowlark WRP with Recommended Irrigation Criteria	5-18
6.1	Existing and Ultimate Reclaimed Water Users	6-4
8.1	Meadowlark Water Reclamation Plant, Expansion Design Loadings	8-3
8.2	Effluent Available From Shadowridge	8-5
8.3	Reclamation Alternatives	8-9
8.4	Reclaimed Water Cost Analysis Model - with Demineralization and Maximum MWD Rebate	8-23
8.5	Comparison of Demineralization and Imported Raw Water Alternatives	8-24
8.6	Reclaimed Water Cost Analysis Model - without Demineralization and Maximum MWD Rebate	8-25
8.7	Reclaimed Water Cost Analysis Model - with Demineralization and Limited MWD Rebate	8-27
8.8	Reclaimed Water Cost Analysis Model - without Demineralization and Limited MWD Rebate	8-29

LIST OF FIGURES

2.1	Recommended Reclaimed Water Facilities and Distribution System (Alternative No. 9)	2-7
3.1	Reclaimed Water Distribution System	3-6
3.2	Percent Annual Demand Variance	3-10
3.3	Average Annual Demand Variance	3-11
5.1	Encina Wastewater TDS Variation	5-8

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

**VOLUME IV
RECLAIMED WATER**

TABLE OF CONTENTS
(Continued)

6.1	Existing and Ultimate Reclaimed Water Users	6-3
8.1	Master Plan Update Meadowlark Water Reclamation Plant Site Plan	8-4
8.2	Carlsbad Municipal Water District Master Plan Update Encina Water Reclamation Plant Flow Schematic	8-8
8.3	Alternative No. 3 Reclaimed Water Facilities and Distribution System	8-13
8.4	Alternative No. 4 Reclaimed Water Facilities and Distribution System	8-14
8.5	Alternative No. 5 Reclaimed Water Facilities and Distribution System	8-17
8.6	Alternative No. 6 Reclaimed Water Facilities and Distribution System	8-21
8.7	Alternative No. 7 Reclaimed Water Facilities and Distribution System	8-22
8.8	Recommended Reclaimed Water Facilities and Distribution System (Alternative No. 9)	8-31

**CARLSBAD MUNICIPAL WATER DISTRICT
MASTER PLAN UPDATES**

LIST OF ABBREVIATIONS

ADD	Average Day Demand
ac	acre
AC	Asbestos Cement
AF	Acre foot
cfs	cubic feet per second
CIP	Capital Improvement Program
CMWD	Carlsbad Municipal Water District
CWA	County Water Authority
DU	Dwelling Unit
EWPCF	Encina Water Pollution Control Facility
fps	feet per second
GIS	Geographic Information System
gpm	gallons per minute
HGL	Hydraulic Grade Line
HWL	High Water Level (maximum water surface elevation in storage tanks)
MD	Maximum Day
MDD	Maximum Day Demand
MG	Million Gallons
mgd	million gallons per day
mg/l	milligrams per liter
MWD	Metropolitan Water District of Southern California
No.	Number
PH	Peak Hour
PRV/PSV	Combination PRV and PSV
PSV	Pressure Sustaining Valve
psi	pounds per square inch
PVC	Polyvinyl Chloride
R.O.	Reverse Osmosis
RTV	Remote Terminal Unit
SANDAG	San Diego Association of Governments
SDCWA	San Diego County Water Authority
SCADA	Supervisor Control and Data Acquisition
TAP	Tri-Agency Pipeline
VFD	Variable Frequency Drives
WD	Water District
WRP	Water Reclamation Plant

1.1 Introduction

The Carlsbad Municipal Water District provides water, reclaimed water, and sewer service within the City of Carlsbad, located in coastal, north San Diego County. The District covers most of the City's boundary, with other special districts providing services at the southeast corner of the City.

The District is a political subdivision of the City of Carlsbad. The Mayor and City Council are the District's governing board. District management and engineering operates as a City Department. One of the main differences is that the District operates under the Municipal Water District Act of 1911. The District has a General Manager and District Engineer position.

1.2 Past Master Plans

The District last updated the water, reclaimed water, and sewer master plans about 1990. These master plans assumed that only imported water would be used to meet the District's water supply requirements. The City also adopted a new General Plan in 1994. This included land use and population projections. The projections differ somewhat from the previous City master plan.

Based on the above, the District began updating their master plans in June, 1996. Carollo Engineers with ASL Consulting Engineers, Inc. were retained to do this work. Morris Water Resources Consultants, as a Subconsultant to Carollo, had the primary responsibility to prepare a water resources over-view. This element is to look at the potential for developing local water resources, including seawater desalination.

Five master plan volumes have been prepared as follows:

Volume	Element
I	Environmental Setting
II	Water Resources Potential
III	Water System
IV	Reclaimed Water
V	Sewer

This is Volume IV of the master plan updates.

1.3 Existing Reclamation Program

Reclaimed water refers to wastewater that has been highly treated to meet the requirements of Title 22 of the California Administrative Code. Treatment processes include secondary, filtration, and disinfection. More recently, there has been a trend to refer to this water as "recycled" water. This term will likely be the accepted definition in the future. For this report, the terms reclamation and reclaimed water will continue to be used.

The Carlsbad Municipal Water District has implemented Phase I of their water reclamation program. Its goal was to economically utilize existing reclaimed water sources, pipelines, and reservoirs. The sources of water include the 2.0 million gallon per day (mgd) Meadowlark Water Reclamation Plant owned by the Vallecitos Water District and the 0.75 mgd Gafner Water Reclamation Plant owned by the Leucadia County Water District. The effluent is used through agreements between the District and these special districts. In 1995, over 1,100 acre-feet of reclaimed water was applied. In 1996, peak month demands exceeded the supply, and the reclaimed water was supplemented with potable water.

Funding for Phase I include a loan from the State Revolving Loan Fund. The monies were used for improvements at the Meadowlark plant, a reclaimed water pump station, and additional distribution pipelines. The District currently receives rebates from the San Diego County Water Authority and the Metropolitan Water District. The rebate is based on the amount of reclaimed water delivered times a set rate.

1.4 Purpose and Scope

The purpose of this update is to define the Phase II program. This includes an update of potential reclaimed water users, identification of sources such as the effluent from the Encina Wastewater Pollution Control Facility, development of distribution and treatment alternatives, cost evaluations, and development of a recommended phasing program.

The detailed scope of work is included in Appendix A, Volume I.

SUMMARY AND RECOMMENDATIONS**2.1 Phase I Program**

In 1990, the District completed its first reclaimed water master plan. The report recommended a Phase I project that would deliver 2,354 acre-feet (AF) per year with an ultimate potential demand of 11,480 AF.

The District has fully implemented Phase I. In 1996, a total of 1,418 AF was delivered to reclaimed water users. The users include the La Costa Resort and Spa, the Aviara Resort, landscape irrigation within the Aviara development, and other users generally in the southern portion of the City.

The sources of reclaimed water include the 2.25 million gallon per day (mgd) Meadowlark Water Reclamation Plant and the 0.75 mgd Gafner Water Reclamation Plant. The Meadowlark plant can deliver 2.00 mgd of reclaimed water for a total output of 2.75 mgd. These facilities are owned and operated by the Vallecitos Water District and the Leucadia County Water District, respectively. The water is purveyed by the Carlsbad Municipal Water District through inter-agency agreements.

Because of seasonal demand variations, the maximum annual application of reclaimed water is limited to about 1,500 AF using existing sources.

The Phase I facilities were financed with State Revolving Loan Program funds. The loan repayment is about \$160,000 per year. The reclaimed water is sold at 95 percent of the potable water rate, or about \$703 per AF. The existing Phase I program costs are less than the revenues received, providing for future expansion and replacement.

2.2 Future Demands

There are approximately 200 existing and potential users of reclaimed water within the City. These include golf courses, parks, schools, CALTRANS, median irrigation, flower fields, Legoland, and other landscape irrigation. The potential demand is over 11,000 AF per year with a peak month demand of 20 mgd. This demand generally agrees with the potential identified in the 1990 master plan.

2.3 Future Sources of Reclaimed Water

For development of all reclaimed water demands, an additional 18.25 mgd of reclaimed water capacity is needed. Potential facilities include:

- Expansion of the Meadowlark Water Reclamation Plant up to 4 mgd. The facility was master-planned for expansions up to 5 mgd. The 4 mgd limit would result in process loadings similar to existing.

- Construction of a new Encina Water Reclamation Plant. This would be located on the property south of the Encina Water Pollution Control Facility (EWPCF). The Encina Wastewater Authority purchased a 32 acre parcel adjacent to the EWPCF for this and other potential uses.
- Use of seasonal storage to meet peak month demands in July, August, and September. By using stored water, the existing treatment capacity can be stretched to irrigate more acres. The reservoirs would be filled during the early spring months when the demands are less. The existing Mahr Reservoir owned by the Vallecitos Water District and Lake Calavera could be used for this purpose.

2.4 Alternative Development

Eight alternatives were developed. They are summarized on Table 2.1. The alternatives would provide for different sized, ultimate programs based on expanding existing facilities. The alternatives range in size from 2,000 to 11,020 AF per year. Alternatives Nos. 1 through 4 are based on expanding the Meadowlark plant by either 1 or 2 mgd and either using seasonal storage or not. Alternative 5 would consist of the existing plants and a new Encina plant at 17.25 mgd. Alternative 6 would use seasonal storage to reduce the size of the new Encina plant to 15 mgd. Alternative 7 is based on a smaller market. The northwest area of the City would not be included. Alternative 8 is similar to 7 but with an expansion of the Meadowlark plant to 4 mgd. Alternatives 9 and 10 assume different markets and project size.

2.5 Analysis Factors

There are two factors that affect the alternative cost as well as overall net revenue. The first is the total dissolved solids (TDS) content in the wastewater. The TDS should be at or below 1,000 milligrams per liter (mg/L) for continued irrigation of turf and ornamentals. The TDS in the EWPCF effluent averages about 1,150 mg/L. This concentration has increased from about 1,000 milligrams over the past 10 years. One reason is the discharge from certain industries with very high TDS concentrations. These industries have been identified through the Encina source control program. They have entered into enforcement compliance schedules to decrease the TDS concentration in their effluent to a maximum of 1,500 mg/L. When this is accomplished, the overall TDS concentration is expected to decrease close to the 1,000 mg/L goal.

The Metropolitan Water District (MWD) will complete a salinity management study in 1997. The study will focus on managing the mineral quality of the water delivered to all customers. If implemented, the potable water quality should also result in lower wastewater TDS levels due to lower initial TDS and less use of water softeners.

The alternatives have been analyzed under two TDS control scenarios. The first would include demineralization of the EWPCF effluent. The analysis has assumed that this would be accomplished by reverse osmosis. The resultant effluent TDS concentration would be 1,000 mg/L. The other alternative would be to blend imported water with a lower TDS concentration (approximately

600 mg/L) with the reclaimed water. This would eliminate the need for the capital and operating cost of the reverse osmosis system.

Table 2.1 Reclamation Alternatives Carlsbad Municipal Water District, Reclaimed Water Master Plan					
Alternative Development					
Alternative	Driven By	Reclaimed Sources	Reclaimed Water Capacity (mgd)	Peak Month Flow (mgd)	Average Annual Demand (AF/YR)
1.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark 	0.75 3.00	3.75	2,000
2.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark 	0.75 4.00	4.75	2,520
3.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark Lake Calavera and Mahr Seasonal Storage 	0.75 3.00 2.15	5.90	3,160
4.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark Lake Calavera and Mahr Seasonal Storage 	0.75 4.00 2.30	7.05	3,780
5.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina 	0.75 2.00 17.25	20.00	11,020
6.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 2.00 15.00 2.30	20.00	11,020
7.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 3.00 13.5 2.3	19.50	9,780
8.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 4.00 11.50 2.30	18.50	9,780
9.	Supply	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP 	0.75 3.00 4.25	8.00	4,480
10.	Supply	<ul style="list-style-type: none"> Gafner Meadowlark Mahr Seasonal Storage 	0.75 4.00 0.90	5.65	2,860

The second factor is available funding. The reclaimed water costs are currently off-set by rebates from MWD through their Local Resources Program. The District has entered a long-term contract with MWD for the Phase I program. The program will pay the difference between the cost of treated water from MWD's Skinner Filtration Plant and the District's total cost of reclaimed water up to \$250 per AF. The contract covers 1,500 AF, and it is assumed that the program will extend to the Phase II program. The rebate is important to make reclaimed water viable.

2.6 Cost Analysis

The cost of the alternatives is compared in Table 2.2. This table gives the capital cost, annual operating cost, equivalent water cost in dollars per acre foot, and estimated net revenue and cost to the District. All costs are reported at a December 1996 level. Capital costs include an allowance of 37.5 percent for engineering, administration, contingencies, and other project costs.

From review of Table 2.2, the following conclusions can be drawn:

- 1) The alternatives using the existing infrastructure at the Meadowlark Water Reclamation Plant, the Gafner Water Reclamation Plant, and the Lake Calavera and Mahr Reservoirs would result in the greatest net revenue to the District. However, the District may choose to implement one of the Alternatives Nos. 5 through 9 as part of an overall, water resources strategy.
- 2) It appears that blending with potable is more cost effective than demineralization. However, the net revenue to the District is greater with demineralization due to the MWD rebate. Further, if the significant TDS dischargers meet the 1,500 mg/L limit, the need for demineralization may be delayed or eliminated.
- 3) The MWD rebates are needed to economically justify Alternatives Nos. 5 through 8. The MWD justifies the rebate based on the avoidance of developing other sources and the pumping cost of State Project Water.
- 4) It is not cost-effective to serve the smaller units in the northern section of the City.
- 5) For an Encina Water Reclamation Plant, Alternative No. 9 is the best apparent alternative.

2.7 Conclusions and Recommendations

It is recommended that the Carlsbad Municipal Water District consider implementation of Alternative No. 9 as Phase II. This would consist of the following elements:

- Construction of a new 4.25 mgd water reclamation plant on the parcel south of the EWPCF.
- Expansion of the Meadowlark WRP by an additional 1.0 mgd.
- Conversion of the existing Mahr and Lake Calavera Reservoirs for seasonal storage.
- Conversion of the Santa Fe I reservoir into diurnal storage.

Table 2.2 Reclaimed Cost Comparison Carlsbad Municipal Water District, Reclaimed Water Master Plan										
Alternative Numbers										
	1	2	3	4	5	6	7	8	9	10
With Reverse Osmosis										
Capital Cost (\$1,000)	1,928	4,626	10,387	16,317	85,854	81,237	69,713	70,546	24,229	7,200
Operating Cost (\$1,000)	244	282	366	427	3,934	3,763	3,244	3,151	1,349	318
Equivalent Cost of Water (\$/AF)	632	656	727	784	1,010	971	956	977	917	685
District Revenue w/full MWD Rebate (\$1,000)	558	703	718	643	(617)	(187)	(15)	(222)	165	769
District Revenue MWD Rebate (\$1,000)	455	468	303	73	(2,997)	(2,567)	(2,085)	(2,292)	(580)	429
With Potable Dilution Water										
Capital Cost (\$1,000)	1,928	4,626	10,387	16,317	66,791	62,437	56,162	57,669	20,076	N/A
Operating Cost (\$1,000)	244	282	366	427	3,096	2,935	2,588	2,322	1,138	N/A
Equivalent Cost of Water (\$/AF)	632	656	727	784	942	903	911	910	889	N/A
District Revenue w/full MWD Rebate (\$1,000)	558	703	718	643	(666)	(210)	(229)	(165)	291	N/A
District Revenue w/limited MWD Rebate (\$1,000)	455	468	303	73	(2,246)	(1,815)	(1,649)	(1,635)	(454)	N/A

The major elements of this program are shown on Figure 2.1.

The program would provide for an annual resource of 4,480 AF. This would represent an increase of just over 3,000 AF as compared to 1996 deliveries. This could represent 16 percent of the District's total projected water demands for the year 2015.

The estimated capital cost for this alternative is \$24,229,000. This is reported at a December 1996 cost level and includes 37.5 percent for engineering, administration, legal, and contingencies. Considering existing and future costs, the unit cost of reclaimed water is \$917 per AF. This amount is expected to be reduced by \$250 through the Metropolitan Water Districts (MWW) Local Projects Program. The net cost of \$667 per AF would provide expected annual revenues of \$165,000 to the District.

OCEANSIDE

OCEANSIDE

Legend

- Carlsbad City Boundary
- Failsafe Lines
- - - Existing Reclaimed Water Lines
- . - . Future Reclaimed Water Lines
- . . . Water Lines Available for Reclaimed Use

Elevations
 660
 550
 384



CALTRANS Line

Pacific

Encina Water Pollution Control Facility 13.5 MGD

Future Encina Water Reclamation Facility 4.25 MGD

A

Ocean

ENCINITAS

Gaffner Water Reclamation Facility (0.75 MGD)

Santa Fe I Tank 2.5 MG (El. 660)

Shadowridge Water Reclamation Plant (1.0 MGD)

Shadowridge Effluent Failsafe Line

SAN MARCOS

Meadowlark Water Reclamation Facility (3.0 MGD)

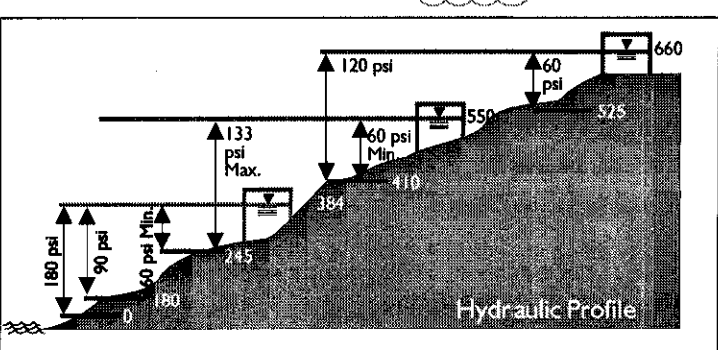
Mahr Reservoir 54 MG (El. 550)

ENCINITAS

WATER, SEWER, RECLAIMED WATER
 MASTER PLANS AND
 WATER RESOURCES DEVELOPMENT PLAN

RECOMMENDED
 RECLAIMED WATER FACILITIES
 AND DISTRIBUTION SYSTEM
 (ALTERNATIVE NO. 9)

FIGURE 2.1



carollo
 engineers

CARLSBAD MUNICIPAL WATER DISTRICT

CARLSBAD\432400\MASTER PLAN\WATER-IV\CA8972-1.CDR

EXISTING RECLAMATION PROGRAM

The Carlsbad Municipal Water District has implemented two reclaimed water projects over the past 5 years. They include the Encina Basin Project-Phase I and irrigation of the La Costa Spa and Resort. The first project was developed through loans from the State revolving fund loan program.

For the La Costa Spa and Resort, the Leucadia County Water District added tertiary treatment to their Gafner Water Reclamation Plant. The water district purchases this water and it is used on the south course at La Costa.

3.1 Past Studies

Since 1978, there have been 22 reclamation studies that have included the City of Carlsbad and adjacent agencies within the study area. These studies have identified markets for the reclaimed water as well as planning for treatment and distribution facilities. They are listed in Table 3.1. The last two major planning efforts are described below.

City of Carlsbad Water Reclamation Master Plan (1)

This plan was prepared jointly for the City, the Municipal Water District, and the San Diego County Water Authority. The report was completed in August 1990. The City of Carlsbad was the study area. The study included a market survey and analysis of treatment and distribution systems.

The report recommended a Phase I project that would deliver 2,354 acre-feet (AF) per year with an ultimate project delivering 11,480 AF per year in the year 2012. The source of Phase I water would be a combination of Meadowlark and Gafner Water Reclamation Plants. A water reclamation plant near the Encina Water pollution Control Facility would be constructed to provide for the subsequent phases. Storage would be provided in the Mahr Reservoir as well as new reservoirs.

North County Water Reclamation Project - Phase II Master Plan (2)

The Leucadia County Water District completed study in April 1997. The study area was the entire Encina Basin as defined within the Basin Plan. It includes several water and sewerage agencies as listed below:

Water Agencies

Carlsbad Municipal Water District
Vallecitos Water District
Olivenhain Municipal Water District
San Dieguito Water District

Sewering Agencies

City of Carlsbad
Vallecitos Water District
Leucadia County Water District
City of Encinitas

The District cost could be reduced by:

- 1) Improvements in the total dissolved solids (TDS) content in the EWPCF secondary effluent. By enforcement of source control standards the TDS could be reduced to a value just over 1,000 milligrams per liter. This could eliminate the need for reverse osmosis. This could reduce the capital cost by an estimated \$4 million.
- 2) Sharing of reservoir volume with the EWPCF for outfall equalization. This is described in a report titled "Joint Use of South Parcel", April 1997 prepared for the Encina Wastewater Authority.

Reservoir Volume would be utilized in the winter for equalization of peak wet weather flows. This would be an alternative to constructing a new ocean outfall. Part of the same volume would be used for the reclamation plant in the summer for diurnal storage. This could reduce District costs by as much as \$1,765,000.

Other recommendations include:

- 1) Secure long-term commitments for the MWD's Local Projects Program. This is an important element in the financial viability of the Phase II Project.
- 2) Set aside 15 acres of the 32 acre parcel south of the EWPCF for reclaimed water.
- 3) Consider Alternative No. 7 as the ultimate, Phase III program.

Table 3.1 Water Reclamation Reports and Studies Carlsbad Municipal Water District, Reclaimed Water Master Plan	
Past Report or Study⁽¹⁾	Date
<i>Overview of Wastewater Reclamation Opportunities, Lowry & Associates</i>	March 1978
<i>Preliminary Design Report, Reactivation of Existing LCWD Reclamation System, Engineering Science, Inc.</i>	January 1979
<i>City of Carlsbad Wastewater Reclamation Master Plan Study, Lowry & Associates</i>	September 1979
<i>Environmental Impact Report for the City of Carlsbad Wastewater Reclamation Master Plan, RECON</i>	September 1979
<i>Environmental Impact and Facilities Plan for a Satellite Sewage Treatment Facility</i>	1980
<i>Proposed Revision Basin Plan Objectives, Carlsbad Hydrographic Subarea, Luke-Dudek Civil Engineers</i>	November 1980
<i>Proposed Revision Basin Plan Objectives, Carlsbad A Portion of the Agua Hedionda Hydrographic Subarea, Luke-Dudek Civil Engineers</i>	November 1980
<i>Preliminary Design Report, Forest R. Gafner Reclamation Plant-AWT Facilities, Engineering-Science, Inc.</i>	May 1981
<i>San Marcos County Water District Meadowlark Reclamation Expansion, Final Environmental Impact Report, WESTEC Services, Inc.</i>	November 1981
<i>Overview for Public non-Potable Water Sources and Master Plan for Public Non-Potable Water System, Woodside/Kubota and Associates</i>	September 1982
<i>Lake Calavera hills Reclamation System Update Report, Glenn M. Reiter & Associates</i>	May 1983
<i>Preliminary Overview of Staff Report on Water Reclamation, San Marcos County Water District</i>	January 1985
<i>Costa Real Municipal Water District Master Plan for Public Water System, Woodside/Kubota & Associates, Inc.</i>	February 1985
<i>Batiquitos Lagoon Reclamation Project Conceptual Plan, Leucadia CWD, Nute Engineering</i>	October 1985
<i>Encina Water Pollution Control Facility 2020 Facility Plan, John Carollo Engineers</i>	August 1987
<i>City of Carlsbad Master Plan of Sewage, Wilson Engineering</i>	December 1987
<i>San Diego Water Reuse Study, Volume V, Encina Basin Feasibility Study, John S. Murk Engineers, Inc.</i>	February 1988
<i>San Luis Rey Santa Margarita Basin Water Study, Phase I - Market Feasibility Study Presentation, Boyle Engineering Corporation and HYA Consulting Engineers</i>	April 1989

Table 3.1 Water Reclamation Reports and Studies Carlsbad Municipal Water District, Reclaimed Water Master Plan	
Past Report or Study⁽¹⁾	Date
<i>Aviara Reclaimed Water Facilities Plan</i> , Luke-Dudek Civil Engineers, Inc.	May 1989
<i>Encina Basin Water Reclamation Project, Phase I Program Facilities Plan</i> , John S. Murk Engineers, Inc.	July 1989
<i>City of Carlsbad Water Reclamation Master Plan</i> , Dudek and Associates, Inc.	August 1990
<i>North County Water Reclamation Project - Phase II Master Plan</i> , Camp, Dresser & McKee	April 1997

The scope included an update of the market, development of treatment, storage, and distribution alternatives, evaluate methods to reduce effluent total dissolved solids, and propose a capital improvement program. The study area for this plan overlaps with the District and includes described common programs and elements. It is broken down into two phases, with the second phase further broken down into stages. They are described as follows:

- Phase I - This includes the program in the City of Encinitas. It will utilize reclaimed water from the San Elijo Water Pollution Control Facility.
- Phase II -
 - Stage 1 - This stage generally describes the Carlsbad Municipal Water District's existing program.
 - Stage 2 - This would serve markets south of the Gafner Water Reclamation Plant along El Camino Real. A flow of 0.25 mgd from the Encina Water Pollution Control Facility would be pumped back for treatment in the existing tertiary facilities at Gafner.
 - Stage 3 - This would serve markets located along Rancho Santa Fe Road by an expanded Gafner Tertiary Facility. A flow of up to 3.3 mgd would be pumped back from the Encina Water Pollution Control Facility to Gafner.
 - Stage 4 - A 4.46 mgd water reclamation plant would be built on a parcel south of the Encina Water Pollution Control Facility. This would be constructed by the Carlsbad Municipal Water District and serve the area in Carlsbad roughly south of Tamarack to La Costa Avenue.

This report describes regional opportunities and involves several water and wastewater agencies.

3.2 District Ordinance

In May 1990, the District adopted an ordinance defining a policy for the use of reclaimed water. The policy states that reclaimed water be used wherever it is economically justified, financially and technically feasible, and consistent with regulations and public health. The policy was adopted as one strategy to develop local supplies that would free potable water in times of drought.

A key element of the ordinance is the requirement for updating the Water Reclamation Master Plan every 5 years. The master plan is to include an evaluation of potential users, required treatment, distribution, and storage facilities, and water quality issues. From the Master Plan, additional potable water uses may be required to convert to reclaimed water. The determination would be based on the policy with respect to economic feasibility, etc., as outlined above.

This report is the 5 year update, and the scope is intended to meet the requirements of the ordinance. The requirement for economic feasibility is also one of the goals for the Phase II program. The findings and accepted recommendations of this report will form the Phase II project.

3.3 Phase I Project

The Carlsbad Municipal Water District is completing implementation of the Encina Basin Project-Phase I as the first step in meeting the goals set forth in the District's ordinance. Construction of the major elements funded by the State Revolving Fund Loan were completed early 1995.

The major elements of Phase I are shown on Figure 3.1. Phase I delivers Title 22 reclaimed water for a wide variety of "unrestricted" uses. These include agriculture, freeway landscaping, and irrigation of landscaping at schools, industrial parks, golf courses, shopping centers, roadway medians and parkways, and in community association maintained residential area. The project took advantage of existing treatment, distribution, and storage facilities wherever possible.

The original application for State Revolving Loan Fund identified four major users with potential annual demand of 1,412 acre-feet (AF) per year (3). Frazee Flowers will be supplied reclaimed water in 1997. These users are listed on Table 3.2. Frazee Flowers and Ukegawa Farms are not current users. The majority of the CALTRANS irrigation began in 1997 when the Interstate 5 pipeline was completed. Other users in addition to those listed have connected to the reclaimed water system.

Table 3.2 Phase I Users Identified in Application for Encina Basin Project ^(a) Carlsbad Municipal Water District, Reclaimed Water Master Plan	
User	Annual Reclaimed Water Demand (Acre-feet per year)
1. Aviara Development	677
2. Frazee Flowers	510
3. Ukegawa Farms	147
4. CALTRANS (I-5 Freeway)	78
TOTAL	1,412

3.4 Source of Reclaimed Water

The source of the Phase I, reclaimed water is the Vallecitos Water District's Meadowlark Water Reclamation Plant. The capacity of this plant is 2.0 million gallons per day, which exceeds the expected Phase I demands. The plant produces effluent that allows for unrestricted use as defined by the California Administrative Code, Chapter 3, Division 4, Title 22. The plant is described in a subsequent section of this Volume.

The Carlsbad Water District purchases the effluent from The Vallecitos Water District through an Agreement entered into on June 13, 1991. The Agreement sets quantity, quality, and pricing parameters. The District may utilize up to the full capacity during peak summer demands. The effluent is to have a total dissolved solids (TDS) content of less than 1,000 mg/L except for periods of drought. In this case, the concentration could increase to 1,200 mg/L. The Vallecitos Water District is not committed to construct demineralization equipment if the concentration does not meet the limit, but the District would not be obligated to take or pay for the water if this occurs.

The initial cost for the water was \$241.00 per acre foot (AF). This rate may be adjusted annually by the Vallecitos Water District on July 1 of each year. The rate in effect for 1996 is \$262 per AF.

Conveyance





The reclaimed water from the Meadowlark Water Reclamation Plant is first pumped to the Mahr Reservoir for storage. Additional pumps, a six-inch force main, a 16-inch return line from Mahr, and micro screens were constructed as part of Phase I.

The effluent from Meadowlark and/or the Reservoir then flows down the fail safe line. The fail safe line was originally constructed to convey the effluent to the Encina Ocean Outfall for disposal. The District now has two connections. The first is a turnout to the La Costa Spa and Resort. The reclaimed water is piped to a pond on the golf course and then pumped to the irrigation system.

OCEANSIDE

OCEANSIDE

Legend

-  Sewer Drainage Basin Boundary
-  Failsafe Lines
-  Existing Reclaimed Water Lines
-  Water Lines Available for Reclaimed Use

CALTRANS Line

Pacific

Encina Water
Pollution Control
Facility

Ocean

ENCINITAS

Gafner Water
Reclamation Facility
(0.75 MGD)

Shadowridge Water
Reclamation Plant
(1.0 MGD)

Shadowridge Effluent
Disposal Line

VISTA

Palomar Airport

Reclaimed Water
Pump Station

Meadowlark Water
Reclamation Facility
(2.0 MGD)

SAN MARCOS

Mahr Reservoir
(El. 550)

ENCINITAS

WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

**EXISTING RECLAIMED WATER
DISTRIBUTION SYSTEM**

FIGURE 3.1

CARLSBAD MUNICIPAL WATER DISTRICT



The second connection of the fail safe line is to the District's reclaimed water pump station. The station is located along the fail safe line east of El Camino Real as shown on Figure 3.1. There are three pumps, two duty plus one stand-by, with a rated station capacity of 2 mgd.

Distribution

The water is pumped into the distribution system shown on Figure 3.1. Potable water Reservoir D-1 and D-2 have both been converted to reclaimed water use. Each of these has a capacity of 1,250,000 gallons. The only other system storage is in the 54 million gallon Mahr Reservoir described above.

In addition to the District's distribution system CALTRANS has constructed a 10-inch reclaimed water pipeline parallel to Interstate 5. This pipeline runs along the west side of the freeway from Palomar Airport Road to Cannon, and on the east side of the freeway from Cannon to Carlsbad Village Drive. It provides irrigation water north to almost the City limits. The original CALTRANS design was for an 8-inch line, and it was up-sized at the District's request to convey reclaimed water to the north end of the City.

Existing Users

A listing of the existing users is given on Table 3.3. The majority users include slope and median irrigation throughout the Aviara Development, the Aviara Resort Golf Course, and La Costa Resort and Spa. This listing represents the users on-line as of December 31, 1995 (4). There were 57 metered accounts or connections with the majority in the Aviara Development. The 57 accounts compares to 36 in June 1995.

Historical Use

The reclaimed water use from 1991 through 1996 is reported in Table 3.4 (4). This lists the total use by year and by month. Delivery started in October 1991, and the total annual use has increased each year. Over 1,418 AF was used in 1996.

In addition, the demand by user for 1995 is given on Table 3.3. This table lists the demand by month. The accounts are grouped in some instances by major user such as the Aviara Master Association. Almost all of the users are in the southern portion of the District and includes the Aviara and La Costa golf courses as well as the landscape irrigation within the Aviara development.

Table 3.3 Existing Users**Carlsbad Municipal Water District, Reclaimed Water Master Plan**

1995 USE (ACRE-FEET)														
User	Type of Delivery	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
Aviara Master Assoc.	Irrigation	7.70	5.88	4.71	20.75	24.52	35.07	38.72	48.17	56.07	41.71	25.92	18.13	327.36
Aviara Resort	Irrigation	2.78	2.97	2.28	13.02	14.03	24.59	22.59	29.73	29.84	23.14	11.55	8.56	185.08
Aviara Land Assoc.	Irrigation	2.20	1.01	0.97	2.61	4.62	5.52	5.45	5.67	8.16	5.62	1.78	1.64	45.26
City Parks	Irrigation	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06
City School District	Irrigation	3.64	0.01	0.69	1.03	5.30	5.30	5.84	6.71	5.63	4.73	3.48	3.17	45.53
La Costa Hotel/Spa	Irrigation	0.00	0.00	0.00	16.12	39.54	52.97	72.07	107.39	76.29	47.72	31.28	26.67	470.04
Avocet, Inc.	Irrigation	0.38	0.29	0.25	0.23	0.44	0.68	0.61	0.79	0.86	0.73	0.36	0.31	5.94
City of San Jose	Irrigation	0.45	0.05	0.08	0.16	0.48	0.69	1.00	1.33	1.24	0.66	0.49	0.38	7.00
The Price Club	Irrigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.11
City Library	Irrigation	0.25	0.00	0.07	0.13	0.56	0.71	0.77	0.88	1.07	0.70	0.59	0.62	6.36
Aldea at Aviara	Irrigation	0.59	0.20	0.07	0.28	0.56	0.82	1.07	1.17	1.43	0.94	0.70	0.59	8.41
D.R. Horton, Inc.	Irrigation	0.03	0.00	0.00	0.14	0.18	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.58
Melano & Co.	Agriculture	0.22	0.12	0.11	0.28	0.13	0.01	0.00	0.21	0.01	0.01	0.03	0.94	2.08
Patrick Property Service	Irrigation	0.00	0.03	0.02	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Barret American, Inc.	Irrigation	0.00	0.07	0.07	0.11	0.14	0.30	1.00	2.67	2.28	1.26	0.98	0.79	9.67
Twin Tanks, CMWD	Irrigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.59	0.26	1.12
P-3	Irrigation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.06	0.01	0.06
Monthly Total		18.27	10.63	9.32	54.93	90.51	126.90	149.11	204.74	182.89	127.60	77.81	62.07	1114.78

Table 3.4 Historical Reclaimed Water Use Carlsbad Municipal Water District, Reclaimed Water Master Plan						
Acre-Feet/Month						
	1991	1992	1993	1994	1995	1996
January	-	21	11	43	18	34
February	-	50	8	25	11	12
March	-	11	16	22	10	17
April	-	28	54	36	56	89
May	-	99	113	64	90	192
June	-	109	128	108	127	153
July	-	125	141	119	80	224
August	-	114	121	151	193	198
September	-	127	151	193	182	181
October	53	121	114	89	129	158
November	44	82	85	69	78	130
December	30	35	31	39	62	30
Annual Total	127	922	974	957	1,036	1,418

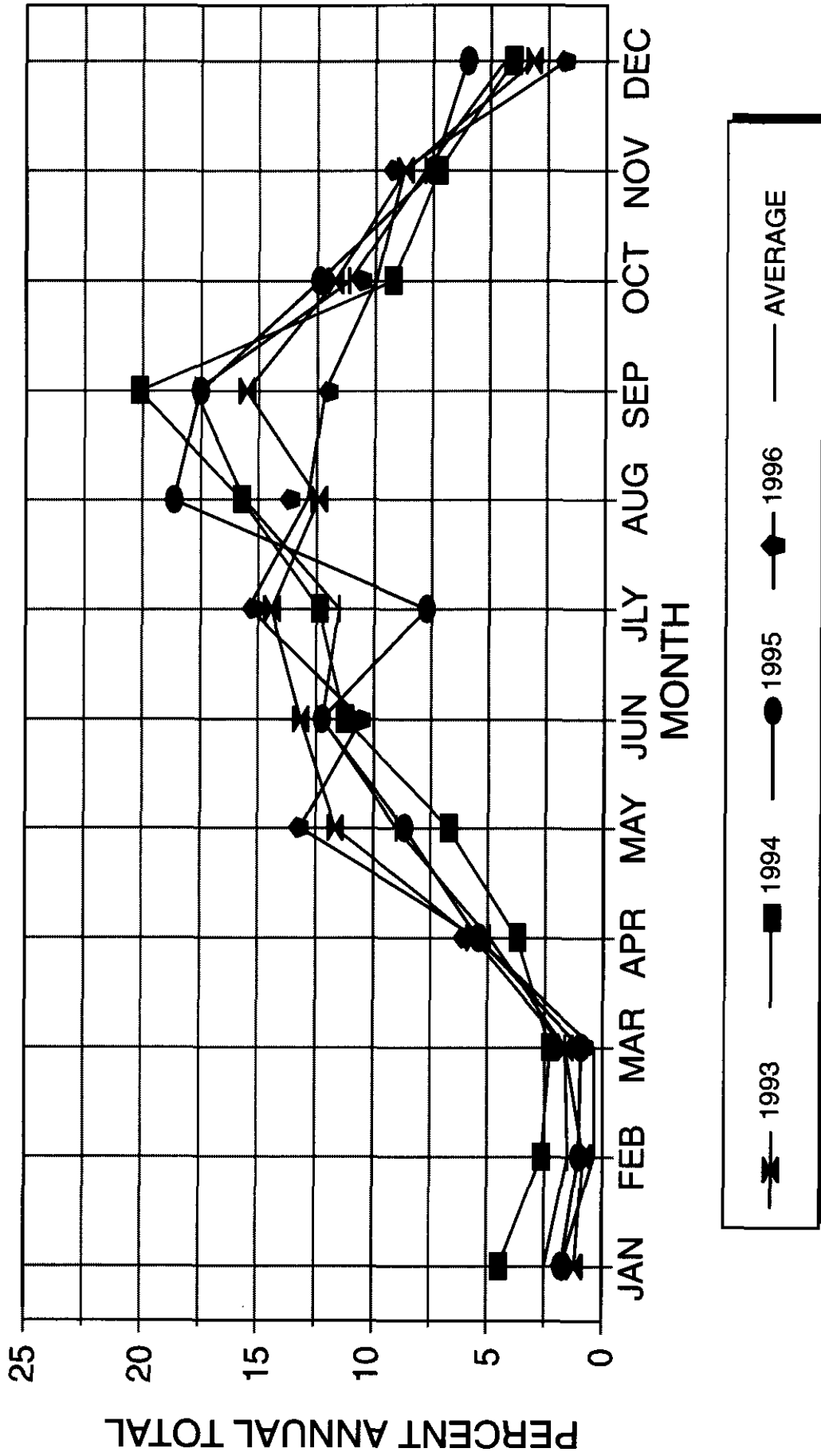
Seasonal Usage

For the period of 1993 through 1995, the seasonal variation in demand is shown on Figure 3.2. This figure gives the demand in percent of average annual demand and by month. The average for the entire period is shown on Figure 3.3. Based on an average of these three years, the highest demand month has been August followed by July. Almost 18 percent of the total annual demand occurs in August. This agrees with the projection in the 1990 Master Plan (1). However, for the entire year, it appears that the actual demand is somewhat shifted to the later summer months than previously estimated.

The greatest historical demand occurred in July 1996. A total of 224 AF or 2.35 mgd was delivered.

3.5 La Costa Resort and Spa

The Carlsbad Municipal Water District is the purveyor of reclaimed water to the La Costa Resort and Spa. One source is the Meadowlark plant as discussed for the Phase I project. In addition, the District sells water to La Costa for irrigation on the south golf course. The source of the



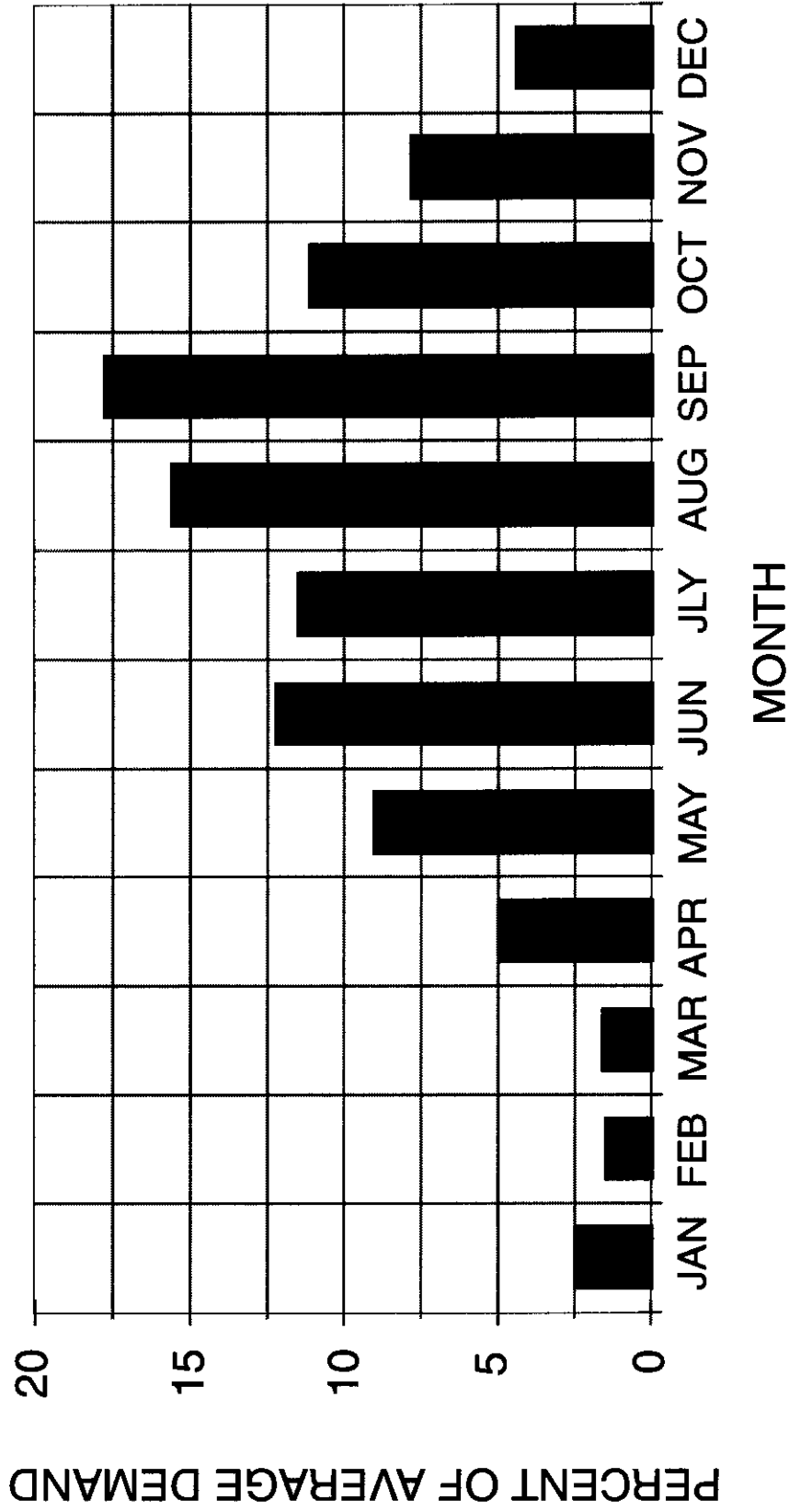
PERCENT ANNUAL
DEMAND VARIANCE

FIGURE 3-2



CARLSBAD MUNICIPAL WATER DISTRICT





**AVERAGE ANNUAL
DEMAND VARIANCE**

FIGURE 3-3



reclaimed water is the Leucadia County Water District's Gafner Water Reclamation Plant. The water is purchased from Leucadia through an agreement dated March 25, 1991. The delivery of the Title 22 water from the upgraded Gafner plant began in September 1994. Historical deliveries are shown on Table 3.5. For 1995, the total delivered amount was 249 AF. This figure is included in the total listed previously in Table 3.6. It was reported that the 1996 use was expected to be higher, and this is demonstrated by the 1996 metered flows to La Costa.

The agreement calls for delivery of up to 0.75 mgd, the capacity of the Gafner plant. The annual delivery was estimated at 394 AF per year, and the reclaimed water is used on the south course. The actual use in 1996, was 385.5 AF, close to the estimated quantity.

The largest historical demand occurred in August 1995 with 52.6 AF used. This equates to an average reclaimed water flow of 0.55 mgd. This is 73 percent of the total capacity of the Gafner Water Reclamation Plant.

The agreement has similar TDS provisions as described for the Vallecitos agreement. The purchase price is ninety-nine percent of the District's retail potable water price. Local rebates from the San Diego County Water Authority or the Metropolitan Water District are the responsibility of and accrue to Leucadia.

The remaining portions of the La Costa Resort and Spa are irrigated with effluent from the Meadowlark Water Reclamation Plant as discussed above.

3.6 Encina CALTRANS Irrigation

The Phase IV expansion of the Encina Water Pollution Control Facility (EWPCF) was completed in April of 1992. The EWPCF provides regional wastewater treatment and disposal for the City of Carlsbad as well as five other contiguous agencies including the City of Vista, the Buena Sanitation District, the Vallecitos Water District, the Leucadia County Water District, and the City of Encinitas.

As a condition of expansion, the Phase IV project included planting of landscaping on the Interstate 5 right-of-way. This was limited to the land immediately east of the EWPCF property line and between the north and south limits. The landscaping is irrigated by filtered secondary effluent from the EWPCF. Though filtered and disinfected, the water does not, nor was required to meet the Title 22 requirements for unrestricted use.

The EWPCF is to maintain and pay for all costs through June 30, 2011. The District should pursue eliminating this delivery with the new CALTRANS line.

3.7 Phase I Costs

This section summarizes the historical project and operating costs for Phase I.

Table 3.5 Purchases from Gafner WRP Carlsbad Municipal Water District, Reclaimed Water Master Plan	
Date	Amount (Acre Feet)
September 1994	8.6
October 1994	23.4
November 1994	8.6
April 1995	13.9
May 1995	17.2
June 1995	19.7
July 1995	28.6
August 1995	52.6
September 1995	35.0
October 1995	41.8
November 1995	27.9
December 1995	12.7
1995 ANNUAL TOTAL	249.4
April 1996	25.6
May 1996	39.8
June 1996	45.6
July 1996	94.2
August 1996	46.2
September 1996	37.2
October 1996	52.3
November 1996	44.3
December 1996	0.0
1996 ANNUAL TOTAL	385.5
(1) Reclaimed Purchases from Gafner were not made for all months in 1994. Annual totals do not apply. (2) No reclaimed water is used in January through March. Potable water is used for TDS leaching.	

Project Costs

Project costs include construction, engineering, legal, fiscal, and administrative items. The Phase I project costs have totaled \$2,980,940 (3). The breakdown of Phase I elements is given on Table 3.6.

Table 3.6 Phase I Project Costs⁽¹⁾ Carlsbad Municipal Water District, Reclaimed Water Master Plan	
Item	Cost
1. Construction of Meadowlark WRP Modifications	\$802,551
2. Construction of El Camino Reclaimed Water Pump Station	\$321,248
3. Construction of Potable & Reclaimed Water Pipelines	\$972,887
4. Construction of I-5 Freeway Crossing	\$170,000
5. Construction of Pipeline at Price Club	\$67,387
6. Construction of Pipeline to Aviara Development	\$221,158
SUBTOTAL	\$2,555,231
7. Engineering, Legal, and Administrative Cost	\$425,709
TOTAL	\$2,980,940
(1) Final Project Financial Report, March 1995	

Annual Costs

The annual costs and revenues for fiscal years (FY) 1991/1992 through 1995/1996 are shown on Table 3.7. The costs include the purchase price from the Vallecitos Water District and the Leucadia County Water District, the cost of potable water to meet total demands, and funding of a reserve fund starting in FY 1994/1995. The reserve fund will be used for expansions and replacement.

The total District cost to supply reclaimed water in terms of dollars per acre foot is as follows:

Fiscal Year	Cost (\$/AF)	Potable Water Rate (\$/AF)
1991/92	\$602	\$501
1992/93	\$713	\$567
1993/94	\$676	\$728
1994/95	\$802	\$741
1995/96	\$806	\$741

The cost does not reflect the rebates from the San Diego County Water Authority or the Metropolitan Water District. Further, these years do not include loan repayments to the State Revolving Loan Fund. This component would increase the apparent cost by about 10 percent. With the rebates, the cost of reclaimed water is favorable when compared to potable water.

Revenue includes sales, the local project rebates from the San Diego County Water Authority and Metropolitan Water District, and transfers from the water fund. Revenues as defined in Table 3.7 have exceeded expenses. The initial construction outlays and transfers from the water fund to cover construction are not included in the above.

Sources of Funds

The project costs have been funded by State Water Resources Control Board loans totaling \$2,425,427 and transfer of District funds. Other sources of revenue include metered reclaimed water sales at the potable water rate and Local Projects Program offsets from the San Diego County Water Authority and the Metropolitan Water Department. These offsets historically totaled \$254 per AF. Of this, \$100 per AF is paid by the County Water Authority. This subsidy will run for two more years. Starting in 1997, the Metropolitan Water District will pay the difference in reclaimed water cost to the treated water cost up to \$250 per AF. This will cover the Phase I program for the next 22 years.

Table 3.7 Cost/Revenue Summary Carlsbad Municipal Water District, Reclaimed Water Master Plan						
ITEM DESCRIPTION	Fiscal Year					
	1991/92	1992/93	1993/94	1994/95	1995/96	
Reclaimed Water Bought from VWD (AC-FT)	444	928	940	759	988	
Reclaimed Water Bought from LCWD (AC-FT)	0	0	0	111	302	
Reclaimed Water Sold (AC-FT)	444	928	940	970	1,290	
Reclaimed Water Rate (\$/AC-FT)	\$501	\$567	\$728	\$741	\$741	
Potable Water Rate (\$/AC-FT)	\$501	\$567	\$728	\$741	\$741	
OPERATION AND MAINTENANCE COST						
Purchase Reclaimed Water from Vallecitos Water District (a)	\$267,405	\$301,280	\$475,544	\$440,754	\$442,276	
Purchase Reclaimed Water from Leucadia County Water District (b)	\$0	\$0	\$0	\$37,752	\$214,814	
Purchase of Makeup Potable Water	\$0	\$214,210	\$42,351	\$12,393	\$2,871	
SWRCB Loan Payment	\$0	\$0	\$0	\$62,894	\$159,527	
Operation & Maintenance		\$146,992	\$118,048	\$135,494	\$220,346	
TOTAL	\$267,405	\$662,482	\$635,943	\$689,287	\$1,039,835	
REVENUE						
Reclaimed Water Sales	\$222,444	\$526,176	\$684,320	\$587,108	\$983,106	
SCWA & MWD Local Project Program (\$100+\$154/AC-FT)	\$112,776	\$235,712	\$238,760	\$249,910	\$303,860	
TOTAL	\$335,220	\$761,888	\$923,080	\$837,018	\$1,286,966	
a) Purchase Cost of Reclaimed Water from VWD is \$262/AC-FT In 1994/95.						
b) Purchase Cost of Reclaimed Water from LCWD is 99% of Potable Water Rate + SDCWA & MWD pass through credit and having a minimum purchase of 394 AC-FT/YR.						

4.1 Introduction

The quality of the reclaimed water distributed by the Carlsbad Municipal Water District is governed by several regulatory agencies. Included in these (and discussed in this section) are the State of California, Department of Health Services (CDHS), the San Diego Regional Water Quality Control Board (RWQCB), and the County of San Diego Health Services Department (SDHSD).

The reclaimed water quality must also meet the individual requirements of potential users. The water quality requirements of individual users that irrigate with reclaimed water are dependent upon the sensitivity of their vegetation to the various constituents contained in the reclaimed water. This will be discussed in greater detail in Section 5 of this report.

4.2 State Requirements

State Department of Health Services (DHS)

The California Water Code directs the CDHS to establish statewide criteria for the use of reclaimed water. The Division of Drinking Water and Environmental Management for CDHS has submitted the *Proposed Wastewater Reclamation Criteria*, (R-13-95) to the Office of Regulations for its review and scheduling for hearing. In the interim, Title 22, Division 4, of the California Administration Code entitled *Wastewater Reclamation Criteria*, (1978) is the standard which CDHS currently enforces.

Title 22 Requirements

Through Title 22, Division 4, of the California Administration Code, bacteriological quality and wastewater treatment level standards are set for various types of reclamation. Title 22's main objective is to promote the reclamation of wastewater, while protecting the public's health. The Title 22 treatment requirements as per intended use are summarized in Table 4.1. As the table illustrates, reclaimed water which is intended for use in areas with unlimited public exposure (unrestricted recreational and irrigation use) must be treated to a tertiary treatment level and disinfected so that its effluent coliform concentration complies with the following limits. The 7-day median coliform count is restricted at 2.2 per 100 ml and single sample coliform counts are not allowed to exceed 23 per 100 ml. Additionally, the average turbidity limit is set at 2 nephelometric turbidity units (NTUs). Also, the reclaimed source is not allowed to exceed 5 NTU's for more than 5 percent of any 24-hour period.

Table 4.1 Title 22 Reclamation Requirements Required Degree of Treatment for Reclaimed Water Carlsbad Municipal Water District, Reclaimed Water Master Plan				
Required Degree of Treatment				
Type of Use	Primary Treatment Only	Secondary Treatment Required ²	Tertiary Treatment Required ³	Required Median Effluent Coliform Concentration ⁴
Spray Irrigation of Food Crops		*	*	<2.2 per 100 milliliters ⁵
Surface Irrigation of Orchards and Vineyards	*			N/A
Irrigation of Fiber, Fodder, or Seed Crops	*			N/A
Irrigation of Pasture for Milking Animals		*		<23 per 100 milliliters
Landscape Irrigation of Areas with Public Exposure (i.e. Parks, Playgrounds, Schoolyards, etc.)		*	*	<2.2 per 100 milliliters ⁶
Landscape Irrigation with Limited Public Exposure (i.e. Golf Courses, Cemeteries, Freeway Landscape, etc.)		*		< 23 per 100 milliliters ⁷
Discharge to Nonrestricted Recreational Impoundment		*	*	<2.2 per 100 milliliters ⁵
Discharge to Restricted Recreational Impoundment		*		<23 per 100 milliliters
Discharge to Landscape Impoundment		*		<23 per 100 milliliters
1. From Sections 60603 through 60319 (Articles 3 through 5) Chapter 3, Title 22 Division 4, California Code of Regulations. 2. Defined in Title 22 as biological treatment and secondary sedimentation. 3. Defined in Title 22 as coagulated, filtered, and clarified wastewater that does not exceed an average operating turbidity of 2 turbidity units not 5 turbidity units more than 5 percent of the time in any 24-hour period. 4. Median coliform concentration not to be exceeded, based on results from the last 7 days for which analyses have been completed. 5. In addition, the maximum coliform concentration of 23 organisms per 100 milliliters is not to be exceeded in more than one sample in any 30-day period. 6. In addition, a maximum coliform concentration of 23 organisms per 100 milliliters is not to be exceeded in any sample. 7. In addition, the number of coliform organisms shall not exceed 240 per 100 milliliters in any two consecutive samples.				

As shown in Table 4.1, the process requirements for treatment of wastewater become more stringent under Title 22 according to the reclaimed water's level of public contact. To be considered suitable for unrestricted recreational use under Title 22, the wastewater is required to undergo oxidation, coagulation, clarification, filtration, and disinfection. Reclaimed water that has been sufficiently treated at this level is expected to meet or be lower than levels of 5 mg/l for both biochemical oxygen demand (BOD) and total suspended solids (TSS). These limits, along with the aforementioned levels

for bacteria and turbidity, constitute the given quality levels for reclaimed water that can be classified under Title 22 for unrestricted recreational and irrigation use. Table 4.2 below details these constituents.

Table 4.2 Title 22 Reclaimed Water Quality Requirements for Unrestricted Recreational Use Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Parameter	Units	Requirement
Biochemical Oxygen Demand (BOD)	mg/L	5 ¹
Total Suspended Solids (TSS)	mg/L	5 ¹
Turbidity (NTU)	NTU	2 ²
Total Coliforms	Number/100 ml	2.2 ³
mg/L = milligram per liter NTU = Nephelometric Turbidity Unit Number/100 ml = Number per 100 milliliters coliform count		
1. Assumed based on oxidation, coagulation, clarification, and filtration process requirements. 2. Mean turbidity, maximum not to exceed 5 NTU's for five percent of any 24 hour period. 3. 7-day median coliform count, maximum not to exceed 23/100 ml.		

Proposed DHS Wastewater Reclamation Criteria

As stated earlier, DHS has submitted its draft Proposed Wastewater Reclamation Criteria, (R-13-95) for review and/or approval (Appendix A). Upon its adoption, it will establish statewide criteria for all reclaimed water in the State of California. While it reads similarly to Title 22, there are some differences in the terminology and criteria which will be discussed as part of this section.

The majority of the requirements in the draft Proposed Wastewater Reclamation Criteria, (R-13-95) are taken from California Water Code §§ 13520 and 13521 (attached as Appendix B). Safety criteria and other quoted requirements are referenced from various other sections of the Water Code and the Health and Safety Code.

The highest water classification for the proposed guidelines is "disinfected tertiary reclaimed water" which is defined in Wastewater Reclamation Criteria, Section 60301.230 of said criteria as "filtered and disinfected wastewater that meets the following criteria:"

"(a) The filtered wastewater has been disinfected by either:

- (1) A chlorine disinfection process that provides a CT (chlorine concentration times modal contact time value) of not less than 300 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or;

- (2) A disinfection process that, when combined with the filtration process, has been demonstrated to reduce the concentration of plague-forming units of F-specific bacteriophage MS2, or polio virus, per unit volume of water in the wastewater to one hundred thousandths (1/100,000) of the initial concentration in the filter influent throughout the range of qualities of wastewater that will occur during the reclamation process. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.
- (b) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters."

Disinfected tertiary reclaimed water can be used for the following per Section 60303 (a) of the proposed CDHS guidelines:

- "(a) Reclaimed water used for the irrigation of the following shall be a disinfected tertiary reclaimed water except that coagulation need not be used as part of the treatment process provided the turbidity of the influent to the filters does not exceed 5 NTU more than 5 percent of the time:
 - (1) Food crops where the reclaimed water comes into contact with the edible portion of the crop. This includes all edible root crops.
 - (2) Parks and Playgrounds.
 - (3) School yards.
 - (4) Residential landscaping.
 - (5) Unrestricted access golf courses.
 - (6) Any other irrigation use not specified in this section and not prohibited by other sections of the California Code of Regulations."

Table 4.3 below, outlines the criteria which will have to be met in the future for waters intended for the above purposes if and/or when the proposed CDHS guidelines are adopted. This table can be compared to Table 4.2, which details the requirements for Title 22 Unrestricted Use of Reclaimed Wastewater, as they describe similar quality waters under the two different guidelines.

Table 4.3 Proposed Wastewater Reclamation Criteria for Disinfected Tertiary Reclaimed Water Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Parameter	Units	Requirement
Biochemical Oxygen Demand (BOD)	mg/L	5 ¹
Total Suspended Solids (TSS)	mg/L	5 ¹
Turbidity (NTU)	NTU	2 ²
Total Coliforms	Number/100 ml	2.2 ³
mg/L = milligram per liter NTU = Nephelometric Turbidity Unit Number/100 ml = Number per 100 milliliters coliform count		
1. Assumed based on conventional treatment including filtration. 2. Mean turbidity, maximum not to exceed 5 NTU more than 5% of the time. No sample to exceed 10 NTU at any time. 3. 7-day median coliform count, maximum not to exceed 23/100 ml twice in any 30 day period. No sample to exceed 240/100 ml at any time.		

Review of New User Level of Treatment

When application is made by a potential new user, the CDHS will review the application to ensure that the intended use is in keeping with the level of treatment provided by the reclaimed water purveyor per Title 22 or the CDHS Wastewater Reclamation Criteria, appropriately.

Cross-Connection Requirements

Upon application by a potential reclaimed user whom already utilizes a potable source, the CDHS will specifically review the new user's plans for the inclusion of a cross-connection prevention plan. This plan should include the installation of any appurtenances which are necessary to prevent any cross-connection contamination between the potable and reclaimed water, as well as provide a plan for periodic shut-down (or cross connection) testing.

The actual oversight of the shut-down testing will be performed by the (SDHSD) as discussed in a subsequent section of this chapter.

San Diego Regional Water Quality Control Board (RWQCB)

The state of California is divided into nine regions under the California Water Code. Each region is responsible for the establishment and enforcement of local water quality standards for the purpose of protecting its surface and groundwater quality. Each region operates under the general guidance and final authority of the State Water Resources Control Board (SWRCB) and the United States Environmental Protection Agency (EPA).

The Regional Board is required by the federal Clean Water Act and the California Porter-Cologne Water Quality Control Act to adopt a water quality plan to guide and coordinate the management of water quality in the region.

In 1975, the Regional Board adopted the *Comprehensive Water Quality Control Plan for the San Diego Basin*, also called the "Basin Plan." The plan was designed to:

- Designate beneficial use of the Region's surface and ground waters;
- Designate water quality objectives for the reasonable protection of those uses; and
- Establish an implementation plan to achieve the objectives.

Over the twenty years since this plan's publication, the approach taken toward effective water quality management has undergone many changes due to growth in population for the region and the subsequent threat of pollution to the region's resources due to this increase. Public input, environmental legislation and regulations, regulatory programs, research, and litigation have also contributed toward the evolution of a new Basin Plan.

In September 1994, the Regional Board adopted the *Water Quality Control Plan for the San Diego Basin (9)* as its new standard. As well as a rewrite of the existing 1975 standards and amendments, the new plan addresses the need for pollution prevention and the cumulative effects of pollution on entire watersheds. The Regional Board's specific regulatory efforts in the coming years will include concerns regarding surface water bottom sediment contamination, ground water contamination and nonpoint sources of pollution.

Water Quality Criteria

There are many different water quality criteria which are designed to protect specific beneficial uses of water. Contained in Appendix C is Table C-1 from the September 8, 1994 *Water Quality Control Plan for the San Diego Basin (9)*. This appendix shows the water quality criteria which the RWQCB considered when designating the water quality objectives for the Basin Plan. These listed water quality criteria are not enforceable as objectives of the Regional Board. They have been presented only as a comparison for the RWQCB Objectives as outlined in the subsequent section.

RWQCB Water Quality Objectives

Effluent limitations which are established by the RWQCB are outlined as "water quality objectives" in Chapter 3 of the *Comprehensive Water Quality Control Plan Report for the San Diego Basin (9)*, also referred to as the "Basin Plan." The Basin Plan, updated in 1995, establishes specific ground and surface "water quality objectives" for groundwater basins and surface water bodies within the San Diego Region. Water Quality objectives must protect the most sensitive of the beneficial uses which are designated for a specific water body. Water quality objectives may be expressed as numerical values for quality constituents or as narrative descriptions. These objectives must be scientifically based and must be as stringent or more stringent than the existing water quality criteria.

The water quality objectives which have been set by the Regional Board for the waters in the San Diego Region will be achieved through the issuance of waste discharge permits and the implementation of the RWQCB water quality control plan.

The California Water Code §13050 (h) defines "water quality objectives" as follows:

"The limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

Water quality objectives for Region 9 of the RWQCB are established to satisfy all of the requirements of the California Water Code, Div. 7 (Porter-Cologne Act) and the Clean Water Act. The objectives as they are established under each of these regulations are summarized in the following sections.

Water Quality Objectives According to the Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act designates water quality objectives for the following reasons (per Section 3 of the Basin Plan):

“Water quality objectives must ensure the reasonable protection of beneficial uses and the prevention of nuisance, recognizing that it may be possible for the quality of the water to be changed to some degree without unreasonably affecting beneficial uses.

“Protection of beneficial uses may not require that water quality objectives protect the existing quality of water. However, water quality objectives cannot be set at a level that would permit water quality to change to such a degree that the beneficial uses designated for protection are unreasonably affected.”

“Water quality objectives must ensure that the water will be suitable for the beneficial uses which have been designated for protection.”

“In establishing water quality objectives, the Regional Board must provide for the reasonable protection of all beneficial uses which are designated for protection, taking into account existing water quality, environmental and economic considerations.”

California Water Code § 13241 provides that the Regional Board shall consider, but is not limited to, the following factors in establishing water quality objectives:

“Past, present, and probable future beneficial uses of water;

Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;

Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;

Economic considerations;

The need for developing housing within the region; and,

The need to develop and use recycled water.”

Water Quality Objectives According to the Clean Water Act

Section 303 of the Clean Water Act requires that the State submit all new or revised water quality standards for surface and ocean waters for the approval of the EPA. The water quality objectives set by the Clean Water Act (referenced from Chapter 3 of the Basin Plan) highlight the following points:

Water quality objectives are called water quality criteria in the Clean Water Act.

"Water quality criteria (i.e., water quality objectives) are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular surface water use. Water quality criteria are qualitative or quantitative estimates of the concentration of a water constituent which, when not exceeded, will ensure water quality use. Water Quality criteria should reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation." 40 C.F.R. 131.3 (b)

"States must adopt water quality criteria (i.e., water quality objectives) that protect designated surface water beneficial uses. For surface waters with multiple beneficial use designations, the water quality criteria shall support the most sensitive beneficial use." 40 C.F.R. 131.11 (a)(1)

"States must adopt water quality criteria (i.e., water quality objectives) for surface water which are based upon US EPA guidance documents or other scientifically defensible methods. Economics are not considered in the development of water quality criteria for surface waters under the Clean Water Act." 40 C.F.R. 131.11 (b)

"Water quality criteria (i.e., water quality objectives) for surface waters can be either numeric or narrative specifications for water quality based on physical, chemical and toxicological data, and scientific judgement. Where numerical specifications cannot be established based upon biomonitoring methods."

40 C.F.R. 131.11 (b).

The term "water quality criteria" has two meanings under the federal Clean Water Act. In one context, water quality criteria is equivalent to water quality objectives. In other, water quality criteria is the standard that a state must impose to protect a surface water beneficial use. In another context, the term "water quality criteria" refers to scientific information the EPA has developed on the relationship that the effect of constituent concentration has on human health, aquatic life, or other uses of water. EPA has published information in documents such as the "Gold Book" (EPA, 1986) and in various individual criteria documents.

Federal Antidegradation Policy

Each state must, under the Clean Water Act, mandate an "*antidegradation*" policy for surface waters which complies with the following three principles. This federal antidegradation policy is as follows:

- (1) The first principle requires that all existing in stream water uses shall be maintained and protected.
- (2) The second principle protects waters whose quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in on the water. For these waters, limited water quality degradation may be allowed if necessary to accommodate important economic or social development in the area in which the waters are

located and if the water quality is adequate to protect existing uses fully.

- (3) The third principle requires maintenance and protection of all high quality waters which constitute an outstanding national resource." 40 C.F.R. 131.12 (a)

The above three principles comprise what is called the "federal antidegradation policy" as set forth in 40 C.F.R. 131.12 (a). This policy acts as a "catchall" water quality standard. In other words, this policy will be applied where other standards are not specific enough for a particular water body or where other standards do not address a particular pollutant. The policy also provides a guideline for the imposition of additional control measures to ensure the maintenance of high quality in stream beneficial uses and surface waters.

State Antidegradation Policy

State Board Resolution No 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, states that for all waters in the State, the Regional Board and the State Board must have sufficient grounds to adopt findings which demonstrate that any water quality degradation will:

- (1) Be consistent with the maximum benefit to the people of the State;
- (2) Not unreasonably affect existing and potential beneficial uses of such water; and,
- (3) Not result in water quality less than described in the Basin Plan."

The policy provides a general principle for nondegradation while at the same time allowing some flexibility for change so as to not hinder the "best interests of the State." Changes in water quality are allowed only where it is in the public interest and beneficial uses are not unreasonably affected.

RWQCB Groundwater Quality Objectives for Watersheds within CMWD Study Area

In keeping with the above RWQCB guidelines, Table 4.4 summarizes the Basin Plan groundwater quality objectives for watersheds within the proposed service area. Policies require water irrigation use at concentration no lower than the quality of the basin's water supply, and no higher than the Basin Plan groundwater quality objectives.

Table 4.4 Basin Plan Groundwater Quality Objectives¹, Watersheds within the CMWD Study Area Carlsbad Municipal Water District, Reclaimed Water Master Plan				
Constituent	Los Manos Hydrologic Subarea^{2,3,4} (HSA 4.31)	Encinas Hydrologic Area^{2,5} (HA 4.4)	Batiquitos Hydrologic Subarea^{2,6,7} (HSA 4.51)	San Elijo Hydrologic Subarea (HSA 4.61)
Total Dissolved Solids	3,500	3,500	3,500	2800
Chloride	800	800	800	700

Sulfate	500	500	500	600
Percent Sodium	60	60	60	60
Nitrate	45	45	45	45
Iron	0.3	0.3	0.3	0.3
Manganese	0.05	0.05	0.05	0.05
Methylene Blue Active Substances (Surfactants)	0.5	0.5	0.5	0.5
Boron	2.0	2.0	2.0	1.0
Fluoride	1.0	1.0	1.0	1.0
<ol style="list-style-type: none"> 1 From RWQCB, San Diego Region: <i>Comprehensive Water Quality Control Plan Report, San Diego Region, 1995.</i> 2. The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the hydrographic area or subarea are as shown. 3. Notwithstanding the Basin Plan water quality objectives, the Regional Board will regulate discharges with HSAa 4.31 in a manner that will protect the waters produced by the existing operating wells. 4. The water quality objectives apply to the portion of HSA 4.31 bounded on the west by the easterly boundary of El Camino Real. 5. Detailed salt balance studies are recommended for determining limiting mineral concentration levels for discharge. Upon completion of the salt balance studies, significant water quality objective revision may be necessary. In the interim period of time, projects involving groundwater recharge with water quality inferior to the listed values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing groundwater quality to the aquifers affected by the recharge. 6. The water quality objectives do not apply to HSA 4.51 between Highway 78 and El Camino Real, and to all lands which drain to Moonlight Creek and Encinitas Creek. The objectives for the remainder of the HSAs are shown. 7. The water quality objectives apply to the portion of HSA 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way, and on the east by the easterly boundary of El Camino Real. 				

RWQCB Permitting Programs

RWQCB's most effective means of providing protection for the Region's water resources is through the issuance of Waste Discharge Requirements (WDRs), Water Reclamation Requirements (WRRs), and Master Reclamation Permits (MRP) for individual dischargers.

The waste discharge requirements impose conditions which protect water quality, implement the Water Quality Control Plan, and when the discharge is to waters of the United States, meet the requirements for the Clean Water Act. The waste discharge requirements impose limits on the quality and quantity of waste discharges and specify conditions to be maintained in the receiving waters. The basic elements, per the Basin Plan, for the waste discharge requirements include:

- Effluent limitation on the quality and quantity of the waste discharge. The effluent standards or limitations are designed to implement water quality control plans, protect beneficial uses, and prevent nuisance;
- Standard terms and conditions and discharge prohibitions to ensure compliance with applicable provisions of state and federal law; and

- A monitoring and reporting program requiring the discharger to collect and analyze samples and submit monitoring reports to the Regional Board on a prescribed schedule.

Water reclamation requirements specify standards for all uses of reclaimed treated wastewater.

National Pollutant Discharge Elimination System (NPDES) permits are regulated by the State of California, as the EPA has delegated responsibility to the State and regional boards for the implementation of the Federal NPDES program. Therefore, WDRs for discharges to surface waters in the State of California can also serve as NPDES permits.

Waste Discharge Requirements

Per Chapter 4 of the Basin Plan, waste discharge requirements are permits for waste discharges to land which could primarily affect ground water quality and beneficial uses. All waste discharges, whether to land or water, are subject to California Water Code § 13263. Furthermore, unless exempt, discharges to land (e.g., landfills) are also subject to Title 23, California Code of Regulations, Chapter 15. Examples of such waste discharges include:

- Sewage treatment plants with discharges to land;
- On-site disposal systems (septic tank systems);
- Sanitary landfills;
- Industrial discharges;
- Land treatment units (bioremediation);
- Dairies; and
- A variety of other activities which can affect ground water quality.

Some types of dredging operations in surface waters are also regulated under waste discharge requirements. Waste discharge requirements may also protect surface waters in those instances where surfacing ground water may adversely affect surface water quality or beneficial uses.

A standard WDR permit typically includes the following elements:

Findings: Official description of the facility, processes, type, and quantity of wastes, existing WDRs, enforcement actions, public notice and applicable Water Quality Control Plans, beneficial uses and water quality objectives;

Effluent limitations: Narrative and numerical limits for effluent and discharge prohibitions;

Receiving water limitations: Narrative and numerical objectives for the receiving waters;

Provisions: Standard provisions required by the Regional Board and by state and federal law;

Compliance schedules: Time schedules for completion of activities to achieve compliance with permit conditions;

Sludge Requirements: Sludge monitoring and control requirements, if necessary; and a

Monitoring and reporting program: Specific locations of monitoring stations and sampling frequency for all constituents limited in the permit, including flow, and other constituents that may be required by the Board.

Any person proposing to discharge waste, other than to a community sanitary sewage system, must file a report of waste discharge (application) to obtain waste discharge requirements at least 120 days prior to commencing the discharge. Typically, in practice, the permitting process will take three months after submittal of application.

The process by which to obtain a Waste Discharge Requirements Permit through RWQCB is as follows:

1. The discharger describes the proposed disposal of wastewater in a document called "Report of Waste Discharge". This report contains the following:
 - a. The design and operation of the treatment facility,
 - b. The discharge quality,
 - c. Demonstration that the RWQCB ground water quality objectives will not be exceeded. This may require that salt or other constituent and water mass balance tests in the hydrologic subarea be performed,
 - d. Demonstration that no surfacing of the reclaimed wastewater will occur downstream of the development,
 - e. Description of measures which will be taken to prevent runoff and flooding,
 - f. Description of measures to be taken to exclude the public from the area, if necessary,
 - g. Description of how the supplier of the reclaimed water will exercise control over its use, and a copy of any agreements made between the supplier: and,
 - h. Final approved Environmental Impact Report or Negative Declaration. The discharger also has to describe storage facilities for use when the water may not be reused, such as during wet weather.
2. The staff of the RWQCB acts as a clearinghouse for the project. It sends the Report of Waste Discharge to the California Department of Fish and Game, the DHS, the SWRCB, County Health, and other agencies for review and input. Comments from these agencies are returned to the staff of the RWQCB who then incorporate them into the tentative Waste Discharge Requirements,
3. The staff of the RWQCB drafts tentative Waste Discharge Requirements for the project,

4. The RWQCB submits the tentative Waste Discharge Requirements to the consulting agencies listed above in step 2, for their review and comment. The RWQCB reviews the comments for possible inclusion in the requirements, and
5. The staff of RWQCB presents the tentative requirements to the RWQCB at a public hearing for adoption. Once adopted, the Waste Discharge Requirements are no longer considered tentative.

In addition to obtaining a waste discharge permit, the following items must be completed and approved before discharge can commence:

1. A design certification report containing an engineering analysis demonstrating that the facility will meet the waste discharge requirements,
2. An engineering report is submitted to the RWQCB and the DHS in accordance with Section 60323 of Title 22 of the California Administrative Code. This report contains an engineering analysis demonstrating that the facility will meet the requirements of Title 22 and a contingency plan assuring that no inadequately-treated wastewater will be delivered to the use area. This report and the design certification may be combined, and
3. Rules and regulation governing the design and operation of the facilities using reclaimed water are established by the discharger for each user. These rules developed in conformance with the DHS guideline and the "Regulations Relating to Cross-Connections" contained in Title 17 of the California Administrative Code. The rules and regulations are submitted to the RWQCB and DHS.

The California Water Code, Div. 7, Ch. 4, Article 4 authorizes the Regional Board to issue waste discharge requirements, review self monitoring reports submitted by the discharger, and perform independent compliance checking. The Regional Board is authorized to take a variety of enforcement actions to obtain compliance with waste discharge requirements. Enforcement of waste discharge requirements is done through the issuance of cleanup and abatement orders, cease and desist orders, administrative civil liability orders and court action. The Regional Board is also authorized to update and review waste discharge requirements periodically.

Existing Waste Discharge Requirements

There are several Waste Discharge Requirements Permits already issued by the San Diego RWQCB. Water Discharge Requirement Permits for the specific purveyors are as outlined in the subsequent sections. Copies of each of these permits is included in Appendix D. The requirements for the levels of applicable water quality parameters are given below.

Vallecitos Water District—Meadowlark WRP

In May 1987, the San Diego RWQCB Adopted *Order No. 87-81, Waste Discharge Requirements For San Marcos County Water District Meadowlark Wastewater Reclamation Project*, which established Vallecitos County Water District as a wholesaler of reclaimed water to the City, and permitted the use of reclaimed water from the Meadowlark WRF to be used in certain portions of the City, including the

areas including the Aviara and La Costa golf courses. *Order No. 87-81* was modified in fiscal year 1992/93. *Order No. 93-23* reflects the latest waste discharge requirements for the Meadowlark Water Reclamation Plant. This is attached as part of Appendix D.

Leucadia County Water District--Forest R. Gafner WRP

Originally, in May of 1987, The San Diego RWQCB Adopted *Order No 87-82, Waste Discharge Requirements for Leucadia County Water District Forest R. Gafner Water Reclamation Plant near the City of Carlsbad, San Diego, California*. The Order stated in its findings that up to 0.75 mgd of effluent from the District's Leucadia County Water District (LCWD), Gafner Water Reclamation Facility is to be used for the irrigation of the La Costa Golf Course. Addendum No. 1 to Order No. 87-82 authorized the Leucadia County Water District to supply reclaimed water to the Carlsbad Municipal Water District from Forest R. Gafner Water Reclamation Plant for distribution anywhere within the City of Carlsbad where the ground water objectives either did not apply or were 3,500 milligrams per liter (mg/l) for the total dissolved solids (TDS).

As part of the FY 1993/94 Waste Discharge Order Update Program, Order No. 87-82 was reviewed by the Regional Board staff in accordance with criteria established in the Administrative Procedures Manual adopted by the State Water Resources Control Board. This Order, Order No. 93-41, which supersedes the previous order and addendum, consolidates and makes changes to the Findings, Requirements, and Monitoring and Reporting Program of Order No. 87-82.

Specific Waste Discharge Permit Requirements

The waste discharge permit requirements for the Gafner and Meadowlark Water Reclamation Plants are summarized on Table 4.5.

Table 4.5 Waste Discharge Permit Requirements for Gafner and Meadowlark WRPs Carlsbad Municipal Water District, Reclaimed Water Master Plan				
Effluent Limitations				
Constituent	Unit	12-Month Average¹	30-Day Average²	Daily Maximum³
Biochemical Oxygen Demand (BOD @ 20° C)	mg/L		30	45
Total Suspended Solids	mg/L		30	45
pH		6.0-9.0*	6.0-9.0*	6.0-9.0*
Total Dissolved Solids	mg/L	400 ⁴		1500
Chloride	mg/L	200 ⁴		500
Manganese	mg/L	0.05		0.06
Iron	mg/L	0.3		0.4
Boron	mg/L	0.5		0.6
Coliform	MPN/100mL		**	**
Turbidity	NTU		***	***

Table 4.5 Waste Discharge Permit Requirements for Garner and Meadowlark WRPs Carlsbad Municipal Water District, Reclaimed Water Master Plan	
Effluent Limitations	
1	The 12-month average effluent limitation shall apply to the arithmetic mean of the results of quarterly averages of all samples collected during the previous 12 months.
2	The 30-day average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 30 consecutive calendar day period.
3	The daily maximum effluent limitation shall apply to the results of a single composite or grab sample.
4	Increment over water supply based on semi-annual analysis of the water supply.
*	Must be within 6.0 - 9.0 at all times.
**	The median number of coliform organisms shall not exceed 2.2 per 100 milliliters and the number of coliform organisms shall not exceed 23 per 100 milliliters in more than one sample within any 30-day period.
***	Not to exceed an average operating turbidity of 2 nephelometric turbidity units (NTU). Not to exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

Water Reclamation Requirements

Reclaimed water is treated wastewater which is treated to a level which will allow direct beneficial use or a controlled use that would otherwise not occur. Reclaimed water used in the Region include, but are not limited to, landscape irrigation, crop irrigation, freeway landscape irrigation, groundwater recharge, soil compaction at construction sites, and for recreational lakes.

The RWQCB may prescribe water reclamation requirements to producers of reclaimed water or those governing its use based on the determination of the Board as to necessity to protect public health, safety, and welfare. The Board's determination is based on the California Water Code, Div. 7, Ch.7, §§ 13500-13556 "*Water Reclamation Law*", which states that no person shall reclaim water or use reclaimed water for any purpose subject to Title 22 criteria until water reclamation requirements have been established or the Regional Board determines that no requirements are necessary.

The RWQCB issues a separate Water Reclamation Requirements Permit to the users and purveyors of reclaimed water. This permit describes the criteria and restrictions required for the safe use of the specific reclaimed water source.

The process which must be followed for receipt of a Water Reclamation Requirements Permit is similar to that of the Waste Discharge Requirements. The Water Reclamation Requirements process is started by sending RWQCB a letter stating who the user will be, and if available, an agreement between the user and the discharger. The user must submit plans and specifications to the state and county health facilities in place of the engineering reports specified above.

If water purveyor requirements are needed, the process for obtaining these is the same as for the Water Reclamation Requirements. Water Reclamation Requirements issued to public agencies as reclaimed water purveyors must have the proposed service area approved for application in the original Waste Discharge Requirements issued to the producer of the reclaimed water. Water Reclamation Requirements for both water users and purveyors require the designation of a Water Master to be in charge of the irrigation system described in the permit, and the preparation of Rules and Regulations for the safe use of the reclaimed water.

Typically, the time that it takes for the water reclamation requirements process is approximately six weeks.

Instead of issuing separate WRRs to each reclaimed water user for a specific project, the Board has the option of establishing Master Reclamation Requirements as part of the waste discharge requirements issued to a supplier/distributor of reclaimed water. The master reclamation requirements must include the following components per the Basin Plan:

- A requirement that the permittee comply with the uniform statewide reclamation criteria established pursuant to State Code § 13521. Permit conditions for a use of reclaimed water not addressed by the uniform statewide reclamation criteria shall be considered on a case-by-case basis;
- A requirement that the permittee establish and enforce rules or regulations for reclaimed water users, governing the design and construction of reclaimed water use facilities and the use of reclaimed water, in accordance with the uniform statewide reclamation criteria established pursuant to § 13521;
- A requirement that the permittee submit a quarterly report summarizing reclaimed water use, including the total amount of reclaimed water supplied, the total number of reclaimed water use sites, and the locations of those sites, including the names of the hydrologic areas underlying the names of the hydrologic areas underlying the reclaimed water use sites;
- A requirement that the permittee conduct periodic inspections of the facilities of the reclaimed water users to monitor compliance by users with the uniform statewide reclamation criteria and the requirements of the master reclamation permit; and
- Any other requirements determined to be appropriate by the Regional Board.

Existing Water Reclamation Requirements Permits

On May 20, 1991, the RWQCB adopted Order No. 91-60, *Water Reclamation Requirements for the Purveyance of Reclaimed Water by the Carlsbad Municipal Water District, San Diego County*. Order No. 91-60 authorizes the Carlsbad Municipal Water District to purvey water from the Shadowridge WRP, the Meadowlark WRP, and the Gafner WRP to the portions of the City of Carlsbad.

4.3 Local Institutions and Requirements

Management and water quality in the study area entails close coordination among the institutions concerned with planning and maintaining environmental quality. The composition, jurisdiction and functions of wastewater management and planning agencies involved in the implementation of the proposed water reclamation project are discussed in the following paragraphs.

California Coastal Commission and Local Coastal Program

With the passage of Proposition 20, the California Coastal Zone Conservation Act of 1972, a State Coastal Zone Conservation Commission, and six Regional Commissions were created. This 1972 Act was subsequently superseded by the 1977 California Coastal Act which spelled out in more detail the policies regarding protection of the resources on the coastal zone. The 1977 Act also initiated the Local Coastal Plan process for local jurisdictions to eventually take over the issuance of the Coastal Development Permits. The City of Carlsbad has taken over jurisdiction except for the area around Agua Hedionda Lagoon. The coastal zone extends from Oregon to the Mexican Border. The zone includes the land and water area seaward to the outer limit of state jurisdiction, including all islands within that jurisdiction. The zone extends landward to the highest elevation of the nearest coastal mountain range.

Within the coastal zone, a permit area extends from the seaward limits of state jurisdiction to 1,000 yards landward from the mean high tide line, subject to specified exceptions. Any development within this permit area is prohibited without a Coastal Development Permit. The Act establishes criteria and requires submission of plans for the preservation and enhancement of the environment and the ecology of the coastal zones of California. It also prescribes standards for the issuance or denial of these special permits.

The Coastal Commission does not have policies specifically regarding reclaimed water, but if the project requires development of presently undeveloped land within the coastal zone, a coastal permit would be required. For development such as installation of a pipeline, a coastal permit would probably not be required if it were installed in easements or right-of-ways which presently contain utilities.

San Diego County

The San Diego County DHS, along with other state and local agencies, reviews the Report of Waste Discharge for the RWQCB.

While the State DHS concerns itself with the review of the conceptual use and main conveyance of the reclaimed water to new user sites, the County has the responsibility of reviewing the individual new-user site applications for on-site conformance with coverage (proper usage) criteria, cross-connection criteria/testing, and overspray/misting testing (to ensure no contamination on adjacent sites).

They are also responsible for mosquito abatement in water impoundments, which includes any open storage reservoirs used for reclaimed water. The mosquito abatement methods include:

1. Impoundments can be lined or sufficiently sloped to discourage rooted aquatic plant growth along pond edges which provide protection for mosquito larvae,
2. Drainage water and impounded water can be circulated and kept moving to minimize mosquito breeding, and
3. Impoundments can be sprayed with a thin layer of an oil-like substance to suffocate mosquito larvae.

Any planned improvements for reclaimed water should receive review by the mosquito abatement group of the County Department of Health Services for vector control guidance.

San Diego County Water Authority

The San Diego County Water Authority (SDCWA) formed the Water Authority Reclamation Advisory Committee (WARAC) in November, 1987. It is made up all public water purveyors and sewer agencies in San Diego County, and will study and evaluate proposed water reclamation projects, and make policy recommendation to the Board of the SDCWA.

Association of Water Reclamation Agencies

In northern San Diego County, many of the cities, water districts, and sanitation districts have joined to form the Association of Water Reclamation Agencies (AWRA). The goals of AWRA, which was formed in 1980, are to promote and encourage the beneficial uses of reclaimed water. Members of AWRA include the Cities of Carlsbad, Oceanside, and Vista; Carlsbad Municipal Water District (CMWD); San Dieguito Water District (SDWD); Vallecitos Water District (VWD); and Vista Irrigation District (VID). The specific objectives and goals of AWRA are to:

1. Provide a forum to discuss and coordinate water reclamation projects,
2. Promote development of reclaimed water to meet the goals and expectations of the area's water users,
3. Develop a project assistance and/or advisory committee,
4. Facilitate interagency and intergovernmental cooperation at all levels,
5. Maintain a library for project reports, sample agreements, contracts, technical specification, rules and regulations applicable to water reclamation, and
6. Maintain a list of agencies providing water reclamation grants.

RECLAIMED WATER QUALITY CRITERIA AND TREATMENT REQUIREMENTS

5.1 Introduction

The purpose of this section is to outline the quality criteria which are governed by regulation and discuss levels which are recommended for the use of reclaimed water based on the existing basin water quality and the reclaimed water's intended use.

5.2 Effluent Quality

The Gafner and Meadowlark plants are required to submit a compliance report in keeping with the regulatory requirements of Title 22. Attached as Tables 5.1 and 5.2, respectively, are the historic water compliance data for the effluent quality.

Gafner WRP Historical Effluent Quality Data

Attached as Table 5.1 are the available quality data for the Gafner WRP. Because of the relative startup of this reclamation facility, the data, which is fairly limited, is only available from October of 1994. Also, there were periods when the plant did not produce any effluent. Therefore, there are intervals when no data were able to be collected.

Table 5.1 Forest R. Gafner Water Reclamation Plant, Historical Quality Compliance Data Carlsbad Municipal Water District, Reclaimed Water Master Plan					
Parameter	Units	Sample Taken: 10/4/94	Sample Taken: 4/95-6/95	Sample Taken: 7/95-9/95	Sample Taken: 10/95-12/95
Chloride	mg/L	490	316	264	252
Chloride Limit (Potable + 200)	mg/L	205	306	284	301
Adjusted Sodium Adsorption Ratio	Ratio	4.6	2.5	3.2	3.0
Total Dissolved Solids (TDS)	mg/L	1218	1138	1056	1137
TDS Limit (Potable + 400)	mg/L	1072	1084	988	1080
Electrical Conductivity	mill mhos/cm	2.03	1.79	1.55	1.82
Sulfate	mg/L	705	462	380	528
Iron	mg/L	0.05	0.12	0.21	0.07

Table 5.1 Forest R. Gafner Water Reclamation Plant, Historical Quality Compliance Data Carlsbad Municipal Water District, Reclaimed Water Master Plan					
Parameter	Units	Sample Taken: 10/4/94	Sample Taken: 4/95-6/95	Sample Taken: 7/95-9/95	Sample Taken: 10/95-12/95
Manganese	mg/L	0.07	0.11	0.07	0.08
Methylene Blue Active Substance	mg/L	0.44	0.26	0.41	0.27
Boron	mg/L	0.5	0.6	0.5	0.6
Fluoride	mg/L	0.6	0.32	0.26	0.24
Source: Forest R. Gafner Water Reclamation Plant, Compliance Reports, 1994-1995.					

Meadowlark WRP Historical Quality Data

Historical data provided in Table 5.2, which follows, date back to January 1989.

Table 5.2 Meadowlark Water Reclamation Plant, Historical Quality Compliance Data Carlsbad Municipal Water District, Reclaimed Water Master Plan								
Parameter	Units	1989	1990	1991	1992	1993	1994	1995
Chloride	mg/L	198	196	200	218	231	227	235
Adjusted Sodium Adsorption Rate	mg/L	N/A	N/A	N/A	N/A	4.020	4.200	3.963
% Sodium	mg/L	0.0167	0.016	0.0175	52.6	47.1	N/A	N/A
Total Dissolved Solids (TDS)	mg/L	759	769	896	985	1055	1044	1052
Electrical Conductivity	mill mhos/cm	N/A	N/A	N/A	N/A	1.711	1.640	1.635
Sulfate	mg/L	229	223	287	337	337	332	333
Iron	mg/L	N/A	N/A	0.283	0.070	0.044	0.039	0.034
Manganese	mg/L	N/A	N/A	0.061	0.053	0.036	0.034	0.037
Methylene Blue Active Substance	mg/L	0.353	0.407	0.735	0.535	0.488	0.345	0.374
Boron	mg/L	0.466	0.445	0.397	0.435	0.429	0.385	0.338
Fluoride	mg/L	0.406	0.601	0.571	0.559	0.583	0.541	0.586
Source: Meadowlark WRP Compliance Reports, 1989-1995.								

Effluent Quality Requirements per RWQCB

The effluent for the Meadowlark and the Gafner plants must meet the numerical limits set by the RWQCB permits. Both plants have the same criteria requirements as given in Table 5.3.

Table 5.3 Meadowlark and Gafner Reclamation, Discharge Permit Requirements Carlsbad Municipal Water District, Reclaimed Water Master Plan				
Effluent Limitations				
Constituent	Unit	12-Month Average ¹	30-Day Average ²	Daily Maximum ³
Biochemical Oxygen Demand (BOD 5 @ 20° C)	mg/L		30	45
Total Suspended Solids	mg/L		30	45
pH		•	•	•
Total Dissolved Solids	mg/L	400 ⁴		1500
Chloride	mg/L	200 ⁴		500
Manganese	mg/L	0.05		0.06
Iron	mg/L	0.3		0.4
Boron	mg/L	0.5		0.6
Coliform	MPN/100 ml		**	**
Turbidity	NTU		***	***
<p>1 The 12-month average effluent limitation shall apply to the arithmetic mean of the results of quarterly averages of all samples collected during the previous 12 months.</p> <p>2 The 30-day average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 30 consecutive calendar day period.</p> <p>3 The daily maximum effluent limitation shall apply to the results of a single composite or grab sample.</p> <p>4 Increment over water supply based on semi-annual analysis of the water supply.</p> <p>• Must be within the limits of 6.0 to 9.0 at all times.</p> <p>** The median number of coliform organisms shall not exceed 2.2 per 100 milliliters and the number of coliform organisms shall not exceed 23 per 100 milliliters in more than one sample within any 30-day period.</p> <p>*** Not to exceed an average operating turbidity of 2 nephelometric turbidity units (NTU). Not to exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.</p>				

Comparison of Effluent Quality to RWQCB Requirements

Comparisons between the RWQCB Water Quality Objectives (as outlined in the Basin Plan and discussed in Chapter 4 of this report) and the Waste Discharge Permit Requirements are made in the ensuing subsections.

Comparisons will be made in tabular form and discussed. The use of "N/A" in any column means that the data is not available.

The biochemical oxygen demand (BOD₅), total suspended solids, coliform, and turbidity constituents are constrained by daily maximum limits and 30-day average limits. Therefore, the quarterly and yearly compliance reports do not provide this data.

Gafner WRP Comparison

As stated earlier, the data from the Gafner WRP is rather limited due to recent startup and periods of non-production. As there is a large gap in the data from the initial sampling to the second, only the last three of the four samplings will be considered for comparison. The average of the three samplings will be considered to be representative of data for the 12-month average for comparison against the 12-month average permit requirements.

Gafner WRP vs. Waste Discharge Permit Requirements

Table 5.4 compares the Gafner WRP effluent data with it's waste discharge permit requirements.

Table 5.4 Comparison of Gafner Data to Permit Requirements Carlsbad Municipal Water District, Reclaimed Water Master Plan			
Constituent	Units	Permit Requirements 12-month average	1995 Data
Total Dissolved Solids (TDS)	mg/L	1082*	1110
Chloride	mg/L	304**	277
Manganese	mg/L	0.07	0.09
Iron	mg/L	0.3	0.13
Boron	mg/L	0.5	0.6
* Based on semi-annual data analysis plus 400 mg/L.			
** Based on semi-annual data analysis plus 200 mg/L.			

Gafner WRP vs. RWQCB Water Quality Objectives

Table 5.5 compares the Gafner WRP effluent data to RWQCB water quality objectives.

Table 5.5 Comparison of Gafner WRP Data to RWQCB Water Quality Objectives Carlsbad Municipal Water District, Reclaimed Water Master Plan			
Constituent	Units	Basin Plan Groundwater Quality Objectives	Gafner WRP 1995 Data
Total Dissolved Solids	mg/L	3,500	1,110
Chloride	mg/L	700	297
Sulfate	mg/L	500	457
Percent Sodium	%	60	55*
Nitrate	mg/L	45	23.5**
Iron	mg/L	0.3	0.1
Manganese	mg/L	0.05	0.09
Methylene Blue Active Substances (Surfactants)	mg/L	0.5	0.3
Boron	mg/L	2.0	0.6
Fluoride	mg/L	1.0	0.3
* Calculation performed from sampling data from December 6, 1995.			
** Data taken from sampling of December 6, 1995.			

Meadowlark WRP Comparison

Table 5.6 compares Meadowlark WRP effluent data to waste discharge permit requirements.

Meadowlark WRP vs. Waste Discharge Permit Requirements

Table 5.6 Comparison of Meadowlark WRP Data with WDR Permit Requirements Carlsbad Municipal Water District, Reclaimed Water Master Plan			
Constituent	Unit	WDR Permit Requirements 12-month Average	Meadowlark Historical Data Average of 1989-1995 Data
Total Dissolved Solids	mg/L	1080*	937
Chloride	mg/L	285*	215
Manganese	mg/L	0.05	0.04**
Iron	mg/L	0.3	0.1**
Boron	mg/L	0.5	0.4
* Requirement estimated from potable samples taken at Gafner WRP for 1995.			
** Data available only for years 1991-1995.			

Meadowlark WRP vs. RWQCB Groundwater Objectives

Table 5.7 compares Meadowlark WRP effluent data to RWQCB groundwater objectives.

Table 5.7 Comparison of Meadowlark WRP Data with RWQCB Groundwater Objectives Carlsbad Municipal Water District, Reclaimed Water Master Plan			
Constituent	Units	Basin Plan Groundwater Quality Objectives	Meadowlark WRP Average of Data for 1989-1995
Total Dissolved Solids	mg/L	3,500	937
Chloride	mg/L	700	215
Sulfate	mg/L	500	297
Percent Sodium	%	60	50*
Nitrate	mg/L	45	N/A
Iron	mg/L	0.3	0.1**
Manganese	mg/L	0.05	0.04**
Methylene Blue Active Substances (Surfactants)	mg/L	0.5	0.5
Boron	mg/L	2.0	0.4
Fluoride	mg/L	1.0	0.5
* Data taken from 1992 and 1993 compliance reports only.			
** Data taken from 1991-1995 compliance reports only.			

Encina Effluent Quality

The discharge requirements set for the Encina Water Pollution Control Facility(EWPCF) do not have limits for total dissolved solids(TDS), sodium, chloride, boron, or other salts that may affect its quality for reclamation. The discharge is to the Pacific Ocean and is regulated by the California Ocean Plan and the current National Pollutant Discharge Elimination System Permit. However, the Encina Wastewater Authority Board has historically and continues to support reclamation policies. To this end, a TDS goal of 1,000 mg/L has been set.

The historical influent, effluent, and potable water TDS is given in Table 5.8. The TDS concentration has exceeded the goal since 1991, and this may be attributed to a combination of drought, potable water quality, and concentrating effects of water conservation.

For 1995, the Encina staff estimated that the TDS was made up by the following contributions:

Source	TDS Contribution (%)
Potable Water	53.0
Residential/Commercial	38.4
ECSA Industrial Users	8.6 (5)

The term ECSA refers to industrial dischargers that have entered Enforcement Compliance Schedule Agreements for TDS discharge concentrations exceeding the current local limit of 1,500 mg/L. There are seven ECSA dischargers as of January 1996. The deadline for compliance is May 1, 1997 but could be extended for 2 years to coincide with the completion of a new water reclamation plant at Encina.

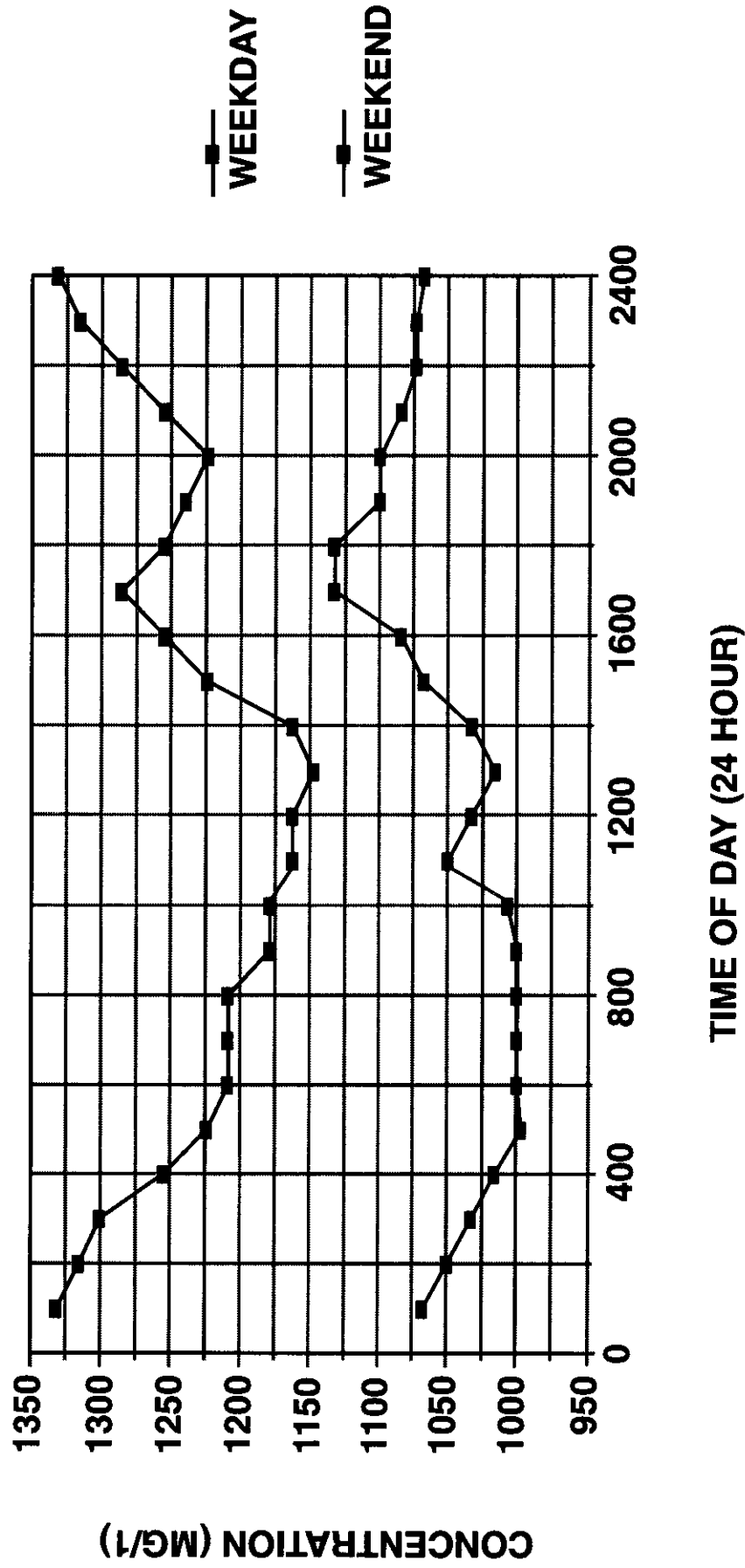
Based on 1995 conditions and all of the ECSA TDS removed from the wastewater, the TDS concentration would still exceed 1,000 mg/L. Other TDS controls such as restrictions on home regenerated water softeners would be required to consistently reduce TDS below the 1,000 mg/L goal. The option would be to demineralize a portion of the effluent from the potential new water reclamation plant. The demineralized flow would be blended back with the remaining flow to achieve the goal.

Table 5.8 EWPCF Annual Average TDS Values (mg/L) Carlsbad Municipal Water District, Reclaimed Water Master Plan			
Year	Influent	Effluent	Potable Water
1989 ⁽¹⁾	968	928	*
1990	976	962	500
1991	1139	1114	618
1992	1225	1209	642
1993	1204	1182	648
1994	1395	1303	660
1995	1212	1152	643
Average 1989-1995	1160	1121	618 *
⁽¹⁾ Encina Wastewater Authority, "Draft TDS Alternative Analysis", January 1996. * Data not available for 1989			

TDS Variation

The EWPCF effluent was tested in September 1996 to determine if there was a diurnal variation in TDS concentration. Some communities have higher wastewater TDS during the early morning hours when home softeners are regenerated.

The variation with time is shown on Figure 5.1. Two days are shown, September 18-19 and September 28-29, 1996. The first percent is a weekday. The second is a weekend. This data does suggest that the TDS quality varies, and by selective pumping, the best effluent could be used for reclamation.



ENCINA WASTEWATER TDS VARIATION

FIGURE 5-1



5.3 Use-Related Quality Limitations

In addition to the regulatory constraints discussed in Section 4 of this report, the use-related water quality considerations may limit the usability of the reclaimed water. For the service area recognized in this report, the reclaimed water is targeted for irrigation of golf courses, general landscape, and nursery use.

To determine a reclaimed water's acceptability as an irrigation source, one must consider the effect of specific ions on the plant growth as well as the physical and chemical factors in the relationship between the ionic concentrations, the soil and the plant metabolism. Specifically, the following factors, which are discussed in subsequent subsections, must be analyzed:

- Salinity
- Soil Permeability
- Specific Ion Toxicities
- Miscellaneous Other Criteria

The constituent most commonly referenced when discussing the acceptability of reclaimed water use is salinity. High salinities can significantly reduce the soil permeability and impair plant growth. Salinity is currently measured directly by the Total Dissolved Solids (TDS) level, inferred from measures of electro-conductivity (EC), or derived from the percent sodium or sodium adsorption ratio (SAR). The SAR, which is an indicator of the relative concentration of sodium to the concentration of calcium and magnesium in the water, is thought to be a more accurate representative for salinity (as discussed in a subsequent subsection of this chapter).

Other parameters within reclaimed water which are negatively associated with plant development include high concentrations of chloride, chlorine residual, boron, nitrogen, and bicarbonate. Table 5.9 provides general guidelines for the restriction of reclaimed water usage based on the maximum recommended concentrations of the more debilitating constituents.

Table 5.9 Guidelines for Irrigation With Reclaimed Water¹ Carlsbad Municipal Water District, Reclaimed Water Master Plan				
		Restriction of Use		
Constituent	Units	None	Slight to Moderate	Severe
Total Dissolved Solids (TDS)	mg/L	< 450	450-2000	> 2000
% Sodium (Surface Irrigation)	mg/L	< 3	3 - 9	> 9
% Sodium (Sprinkler Irrigation)	mg/L	< 70	> 70	---
Sodium Adsorption Ratio (SAR) ²	mmho/cm	< 3	3 - 9	>9

Table 5.9 Guidelines for Irrigation With Reclaimed Water¹ Carlsbad Municipal Water District, Reclaimed Water Master Plan				
		Restriction of Use		
Constituent	Units	None	Slight to Moderate	Severe
Electroconductivity (EC)	mmho/cm	< 0.7	0.7 - 3.0	> 3.0
EC (for SAR of 0 - 3) ²	mmho/cm	> 0.7	0.7 - 0.2	< 0.2
EC (for SAR of 3 - 6) ²	mmho/cm	> 1.2	1.2 - 0.3	< 0.3
EC (for SAR of 6 - 12) ²	mmho/cm	> 1.9	1.9 - 0.5	< 0.5
EC (for SAR of 12 - 20) ²	mmho/cm	> 2.9	2.9 - 1.3	< 1.3
EC (for SAR of 20 - 40) ²	mmho/cm	> 5.0	5.0 - 2.9	< 2.9
Chloride , Cl (Surface Irrigation)	mg/L	< 140	140 - 350	> 350
Chloride, Cl (Sprinkler Irrigation)	mg/L	< 100	100 - 350	> 350
Boron, B	mg/L	< 0.7	0.7 - 3.0	> 3.0
Nitrogen (Total N)	mg/L	< 5	5 - 30	> 30
Bicarbonate, HCO ₃ (Sprinkler Irrigation)	mg/L	< 90	90 - 500	> 500
Chlorine, residual (Sprinkler Irrigation)	mg/L	< 1	1 - 5	> 5
pH	units	---	6.5 - 8.4	---
NOTE: mmhos/cm = millimhos per centimeter				
1	From 1995 Basin Plan (which is partially referenced from <i>Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual</i> , California State Water Resources Control Board, Report Number 84-1, July 1984)			
2	SAR is calculated as in Subsection 5.3.1.1 of this Chapter. At a given SAR, soil infiltration increases as salinity (indicated as EC) increases.			

Table 5.10, shows typical tolerance levels of major San Diego crops to salinity, boron, and chloride. The tolerance levels for salinity are given as a measure of Total Dissolved Solids (TDS) concentrations.

Table 5.10 Salinity, Boron, and Chloride, Nitrogen, and SAR Tolerance Levels for Major San Diego Crops¹ Carlsbad Municipal Water District, Reclaimed Water Master Plan					
Crop	Concentration, mg/L				
	TDS	Boron	Chloride	Nitrogen	SAR ²
Avocados	800	0.5	100	20	4.5
Oranges	1,000	0.5	125	20	4.5
Tomatoes	1,500	1.0	450	--	4.5
Lemons	1,100	0.5	175	20	4.5
Grapefruit	1,100	0.5	125	20	4.5
Tangerines	1,100	0.5	125	20	4.5
Miscellaneous Vegetables	1,100	1.0	--	--	4.5
Strawberries	600	0.5	125	--	4.5
Miscellaneous fruits and nuts	1,000	2.0	--	--	4.5
Pasture and Landscape Grasses	1,500	2.0	--	--	4.5
1 Taken from <i>Area Wide Water Quality Management Plan</i> , San Diego-Riverside 2 SAR defined in Section 5.3 of this report.					

Salinity

Salinity can represent one of the most important constraints for the use of the reclaimed water as a source for irrigation water. Changes in salinity affect the osmotic pressure of the soil solution within the area of the plant's root zone. Therefore, as the salinity rises within a soil solution, the available water for plant consumption will decrease.

Salinity is measured by determining the electrical conductivity (EC) of a solution. EC measures the ability of salts in solution to conduct electricity, expressed in millimhos per centimeter (mmho/cm) at 25° C. Though many of the salts in the soil solution may precipitate out as harmless compounds (e.g. carbonates of calcium and magnesium) or not approach a level which is considered to be harmful, the EC of a specific irrigation water can be directly related to potential plant growth.

Another indicator of high salinity is the concentration of TDS in a reclaimed water source. Table 5.11 compares the use-related and regulatory TDS criteria for reclaimed water usage.

One method of reducing the effects of high salinity in irrigation waters is called leaching. Leaching is the introduction of excess water (beyond the evapotranspiration levels) into the root zone. This excess water should carry the salts in the irrigation water past the root zone before toxic concentrations can accumulate. The main hindrance to leaching is the soil's permeability. The soil

must have permeability rates which will allow adequate penetration of water to provide for evapotranspiration and leaching. Leaching fractions of 15 to 20 percent are considered to be acceptable for most applications. Whereas, leaching fractions of 30 percent or higher over prolonged periods of time can negatively impact plants through water logging and poor aeration.

Table 5.11 McKee and Wolf Classification of Irrigation Waters Carlsbad Municipal Water District, Reclaimed Water Master Plan		
McKee and Wolf note that because of all the variables involved, the classification of waters for irrigation use must be somewhat arbitrary and the limits set cannot be too rigid. The three general classifications of irrigation waters are:		
Class	% Sodium	Description
I	< 30 - 60 %	Excellent to good, or suitable for most plants under most conditions.
II	30 - 75%	Good to injurious, harmful to some plants under conditions of soil, climate and practices.
III	> 70 - 75 %	Injurious to unsatisfactory, unsuitable under most conditions.

Percent Sodium, Sodium Adsorption Ratio and Adjusted Sodium Adsorption Ratio

As stated earlier, excess concentration of sodium in irrigation water reduces soil permeability to water and air. The deterioration by sodium in irrigation water is cumulative and is accelerated by poor drainage.

The specific water quality objective for sodium in the Basin Plan is expressed as percent sodium. Percent sodium is calculated as follows:

$$\% \text{ Na} = \frac{\text{Na}}{\text{Na} + \text{Ca} + \text{Mg} + \text{K}} \times 100\%$$

where: Na, Ca, Mg, and K are expressed in milliequivalent per liter (me/l).

The percent sodium objective was developed for the protection of agricultural uses from the potential hazard due to sodium in irrigation waters. The value of 60% sodium is based upon *Water Quality Criteria*, by McKee and Wolf, 1963.

Since the publication of the percent sodium criteria, technical research has resulted in the development of more applicable criteria for addressing the potential sodium hazard in irrigation water.

The sodium adsorption ratio (SAR) and adjusted sodium adsorption ratios (Adj. SAR) are measures of the potential hazard in soils due to sodium. SAR and Adj. SAR are similar to percent sodium in that their calculated values provide an indication of a soil's potential for permeability and potential aeration problems. However, by taking into consideration the exchange phases between Ca, Na and Mg, the SAR and Adj. SAR predict potential sodium build up in soils. The Adj. SAR calculation further takes into account the effects of carbonate and bicarbonate ion concentrations of a soil.

The calculation for SAR is as follows:

$$SAR = \frac{NA}{\frac{\sqrt{CA+Mg}}{2}}$$

where: Na, Ca and Mg are in me/l.

The calculation for Adj. SAR is as follows:

$$\text{adj. SAR} = \frac{Na}{\frac{\sqrt{Ca + Mg}}{2}}$$

where: Na and Mg are in me/l.

Ca_x is a modified Ca value, calculated using the Suarez table (Table 3-3, contained in *Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual*, California State Water Resources Control Board, Report Number 84-1, July 1984). Ca_x takes into account salinity (as EC), the HCO₃/CO₃ ratio (me/l) and the estimated partial pressure of CO₂ in the top few millimeters of the soil (P_{CO2} = 0.0007 atmospheres).

According to the Basin Plan:

In some cases, adjusted sodium adsorption ratio may be a better indicator of the potential sodium hazard in irrigation water than percent sodium. The Regional Board Executive officer may authorize the use of adjusted sodium absorption ratio instead of percent sodium to indicate the potential sodium hazard. In such cases, the adjusted sodium adsorption ratio shall not exceed the slight to moderate range of value referenced in Table 3-1 "Guidelines for Interpretation of Water Quality for Irrigation". (Reference Table 5.8 of this Report)

Permeability

Another factor to consider in relation to the use of reclaimed water for irrigation purposes is the permeability of the soil which supports the plants to be irrigated. Permeability of the soil affects the ability of the water to be transported to the roots of the irrigation plants.

Permeability has to do with the balance between the organic and clay fractions of the soil (which carry a predominantly negative charge) and the varying amounts of cations (positively charged ions) in the soil. Irrigation and fertilization can disturb the concentration of the cations which can be adsorbed by the soil by altering the ionic equilibrium. When calcium is the predominant cation which is adsorbed on this exchange complex, the soil develops a granular structure which is easily worked and permeable. However, if the concentration of adsorbed sodium exceeds 10 to 15 percent of the total cations in the soil, the structure can be less permeable. Exception to this would occur when the total salt concentration is maintained at a high enough rate to cause a flocculated condition.

Therefore, irrigation plants which receive high sodium content reclaimed water can suffer from permeability problems within the soil structure. One method of reducing the damage to plants within these areas is to treat the soil with a calcium-rich compound such as gypsum. The excess calcium will chemically replace the sodium within the soil, thus increasing the permeability of the soil.

Specific Ion Toxicities

As shown in Table 5.8, above, there are a number of constituents which are contained in reclaimed water which can cause adverse affect to recipient vegetation. For example, high concentrations of sodium and chloride are extremely deleterious to tree crops, woody perennials, and annuals. Also, when applied by sprinkler, reclaimed water which is high in sodium and chloride can cause special problems due to foliar absorption.

Sodium

Sodium is a naturally occurring constituent of waters. Wastewater from municipal sources will have a higher sodium content due predominantly to the collective effect of individual water softeners. Also, within the CMWD, there is a high impact from industrial sources.

Though sodium can be very toxic to some plant varieties, the negative impact to plants grown in soils containing high levels of sodium results from the negative impact that the sodium has on the soil (i.e. permeability).

The use of soil amendments such as gypsum (calcium sulfate) and elemental sulfur (S) can reduce the amount of sodium available on the cation exchange sites of the soil structure, which will ultimately lessen the negative effect that the sodium has on the soil and/or plants. These materials are relatively inexpensive and easily applied to the soil.

Chloride

Chloride toxicity is the most common toxicity that occurs from irrigation water because it moves readily in the transpirational stream of plants. It can also occur from direct absorption through the leaves.

As well as creating the most common toxicity, chlorides in reclaimed irrigation water can be among the most detrimental to irrigation plants. Plants which suffer from high chloride levels exhibit retarded growth. Chloride damage can be symptomized by yellowing of leaves with subsequent burning around their perimeters and excessive leaf exfoliation.

Boron

Boron, which is necessary in low concentrations for regular plant development, can be very toxic at levels greater than 0.5 mg/L. The US EPA has established a water quality criterion for long term-irrigation on sensitive crops such as citrus of 0.75 mg/L. Even the most tolerant of plants cannot handle concentrations in excess of 4.0 mg/L. As per Table 5.9, levels of 0.5 mg/L are not recommended for extended irrigation on San Diego's more sensitive crops.

Boron is absorbed by the roots and transported ultimately to the leaf tips of the plant. When the water transpires from the leaf tissue, the boron residual is left. Symptoms of this residual damage are yellowing and/or burning of the vegetation's leaves, premature leaf drop, and a reduction in yield. As this is a cumulative process, the quality of the soil, drainage conditions, amount of irrigation water applied, and climatic conditions (such as rainfall) can greatly modify the safe concentration levels. Symptoms of boron damage are usually not seen for several years (due to its cumulative nature) and therefore only evident in more mature vegetation.

Though boron can be extremely damaging to ornamental and woody vegetation, boron toxicity does not seem to pose a problem for turfgrass. This has been attributed to the fact that boron, which accumulates in the leaf tips, is removed from turfgrass by frequent mowing.

Bicarbonate

The concentration of bicarbonate (HCO_3) ion in a reclaimed water can adversely affect the soil permeability, and, therefore, must be evaluated along with the sodium calcium and magnesium content of both soil and water. The bicarbonate ion may combine with calcium and/or magnesium and precipitate as calcium and/or magnesium carbonate. As the calcium and magnesium precipitate from the soil, the SAR of the solution, and thus the exchangeable sodium percentage (ESP) of the soil will increase.

The other negative effect which bicarbonate can have on soil, is by increasing its pH level to moderately alkaline conditions. Trace element deficiencies often occur in plants grown in soils with high pH. For example, in the western United States, high soil pH is one of the major factors which causes iron deficiency chlorosis.

Nitrogen

Wastewater contains several different forms of nitrogen, mostly ammonium (NH_4) with some nitrate (NO_3), which will act in a similar manner as applied fertilize nitrogen. When nitrogen is applied in these forms, the nitrifying bacteria in the soil will convert it to available nitrate ion. Organic forms of nitrogen undergo biodegradation with conversion to simple inorganic forms which plants can assimilate. Though nitrogen is an essential component of plant proteins and other constituents, excessive nitrogen levels may cause problems in some sensitive plants by overstimulating plant growth instead of flowering and/or producing fruit.

For the most part, turfgrass is fairly resistant to high nitrogen levels. However, turf may experience heat stress if it receives too much nitrate through a combination of reclaimed water and

supplementary fertilization. One method of avoiding this is to reduce or alleviate the addition of fertilizer during the summer months.

Other Criteria

As with other elements, some trace elements are essential for plant development and only produce negative effects when the plant tolerance levels are exceeded. When adding an element to the soil via irrigation, it may decrease in concentration as it combines with the soil, or it may accumulate in the soil over an extended period of time. After continued application at a certain level, a steady state condition will be approached in which the amount of the element leaving the soil through the drainage water will equal the amount that is added by the irrigation water. As long as the concentration within the irrigation source remains the same, there will be no flocculation in the concentration within the soil. Table 5.12, below, provides guidelines for safe concentrations of specific trace elements for irrigation waters.

Table 5.12 Guidelines for Trace Elements in Irrigation Water Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Element	Recommended Maximum Concentration, mg/L	
	Continuous Use on All Soils	Up to 20 Years Use on Fine Textured Soils or Ph 6.0 to 8.5
Aluminum	5.0	20.0
Arsenic	0.1	2.0
Beryllium	0.1	0.5
Boron	--	2.0
Cadmium	0.01	0.05
Chromium	0.1	1.0
Cobalt	0.05	5.0
Copper	0.2	5.0
Fluoride	1.0	15.0
Iron	5.0	20.0
Lead	5.0	10.0
Lithium	2.5	2.5
Manganese	0.2	10.0
Molybdenum	0.01	0.05
Nickel	0.2	2.0
Selenium	0.02	1.02
Vanadium	0.1	1.0
Zinc	2.0	10.0
Source:	Environmental Studies Board, National Academy of Science, National Academy of Engineering, Water Quality Criteria, 1972.	

Another problem which can develop from the use of reclaimed water as an irrigant, is the deposition of suspended solids in the soil structure. Incidence of this is higher in soils which consist primarily of clay or colloidal material. As the solids collect on and within the soil structure, crusts form and reduce seeding emergence. These crusts may also reduce infiltration, reduce irrigation efficiency and impede the leaching within saline soils.

Comparison of Existing Effluent with Recommended Irrigation Parameters

Gafner WRP Effluent vs. Recommended Irrigation Criteria

Table 5.13 compares Gafner WRP effluent to recommended irrigation criteria.

Table 5.13 Comparison of Gafner WRP with Recommended Irrigation Criteria Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Constituent	Recommended Restriction of Use ¹	Restricted Use for San Diego Crops ²
Total Dissolved Solids (TDS)	Slight to Moderate	Not recommended for avocados, oranges, or miscellaneous fruit and nut trees. Levels acceptable for some citrus, miscellaneous vegetables, and pasture/landscape grasses.
% Sodium (Surface Irrigation)	Severe	Not recommended for most crop vegetation.
% Sodium (Sprinkler Irrigation)	None	No restriction for most crop vegetation.
Sodium Adsorption Ratio (SAR)	None	No restriction for most crop vegetation.
Electroconductivity (EC)	Slight to Moderate	N/A
Electroconductivity for Specific SAR	Slight to Moderate	N/A
Chloride (Surface Irrigation)	Slight to Moderate	Not recommended for most crop vegetation.
Chloride (Sprinkler Irrigation)	Slight to Moderate	Not recommended for most crop vegetation.
Boron	None	Not recommended for avocados, most citrus, or strawberries. Acceptable for tomatoes, misc. vegetables, misc. fruits and nuts, and pasture/landscape grasses.
Nitrogen	N/A	N/A

Table 5.13 Comparison of Gafner WRP with Recommended Irrigation Criteria Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Constituent	Recommended Restriction of Use ¹	Restricted Use for San Diego Crops ²
Bicarbonate (Sprinkler Irrigation)	N/A	N/A
Chlorine, residual (Sprinkler Irrigation)	N/A	N/A
¹ Comparison made with Table 5.8, Guidelines for Irrigation with Reclaimed Water. ² Recommendations made from Table 5.9, Tolerance Levels for Major San Diego Crops.		

Meadowlark WRP Effluent vs. Recommended Irrigation Criteria

Table 5.14 compares Meadowlark WRP effluent to recommended irrigation criteria.

Table 5.14 Comparison of Meadowlark WRP with Recommended Irrigation Criteria Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Constituent	Recommended Restriction of Use ¹	Restricted Use for San Diego Crops ²
Total Dissolved Solids (TDS)	Slight to Moderate	Not recommended for avocados, oranges, or miscellaneous fruit and nut trees. Levels acceptable for some citrus, miscellaneous vegetables, and pasture/landscape grasses.
% Sodium (Surface Irrigation)	Severe	Not recommended for most crop vegetation.
% Sodium (Sprinkler Irrigation)	None	No restriction for most crop vegetation.
Sodium Adsorption Ratio (SAR)	Slight to Moderate	No restriction for most crop vegetation.
Electroconductivity (EC)	Slight to Moderate	N/A
Electroconductivity for Specific SAR	Slight to Moderate	N/A
Chloride (Surface Irrigation)	Slight to Moderate	Not recommended for most crop vegetation.
Chloride (Sprinkler Irrigation)	Slight to Moderate	Not recommended for most crop vegetation.

Table 5.14 Comparison of Meadowlark WRP with Recommended Irrigation Criteria Carlsbad Municipal Water District, Reclaimed Water Master Plan		
Constituent	Recommended Restriction of Use¹	Restricted Use for San Diego Crops²
Boron	None	Not recommended for avocados, most citrus, or strawberries. Acceptable for tomatoes, misc. vegetables, misc. fruits and nuts, and pasture/landscape grasses.
Nitrogen	N/A	N/A
Bicarbonate (Sprinkler Irrigation)	N/A	N/A
Chlorine, Residual (Sprinkler Irrigation)	N/A	N/A
¹ Comparison made with Table 5.8, Guidelines for Irrigation with Reclaimed Water. ² Recommendations made from Table 5.9, Tolerance Levels for Major San Diego Crops.		

Industrial Water Quality Criteria

As with irrigation uses, industrial water users may be sensitive to the reclaimed water quality. Each industrial user will have criteria which is specific for its own process. For example, some cooling water applications and boiler make-up water may require that the reclaimed water to be used is relatively organic and mineral free. Conversely, some processes such as gravel washing may be relatively unaffected by the quality of the reclaimed source. Therefore, it is recommended that each industry should be assessed on an individual basis to determine whether reclaimed water is an acceptable alternative to the use of potable sources.

Ecological Enhancement Water Quality Criteria

Use of reclaimed water for ecological enhancement of streams, lakes and other recreational areas is sensitive to the quantity of flow of the reclaimed water source and the nutrient content of both the reclaimed water source and the receiving body. Lacustrine and coastal wetland environments can be expected to be sensitive to the changes in stream flow and water quality, particularly with regard to the addition of nutrients from reclaimed water discharges.

PHASE II MARKET DEVELOPMENT**6.1 Introduction**

The Phase I market included large agricultural users, the La Costa Resort and Spa, Aviara, and other smaller users. These users are located generally in the southern portion of the City of Carlsbad. Phase I took advantage of existing treatment, storage, and distribution systems to a large degree.

This section identifies the potential Phase II market. It includes an update from past studies as well as a review of current development plans. A listing of the potential market is given along with type of use, quality requirements, annual use, and peak use.

6.2 Past Market Studies

The most recent reclaimed water market studies for the service area are the "City of Carlsbad Water Reclamation Master Plan" (1) and the "Encina Basin Demonstration Project Water Reclamation Master Plan" (2).

"WATER RECLAMATION MASTER PLAN" The service area for this study was the Carlsbad city limits. This includes some overlap with the Olivenhain Municipal Water District and Vallecitos Water District. Potential uses included agriculture, golf course, freeway median, parks and schools, residential and commercial/industrial landscape irrigation. Other industrial as well as groundwater recharge and ecological enhancement were discussed. However, these potential markets were dismissed as impractical.

The report identified a potential market of 11,478 acre-feet (AF) per year with a daily peak use of 21.25 million gallons per day (mgd).

"NORTH COUNTY WATER RECLAMATION PROJECT--PHASE II MASTER PLAN" The study area for this report includes the City of Carlsbad with overlap with the Vallecitos Water District, the Olivenhain Municipal Water District, and the San Dieguito Water District. The study area was defined with respect to availability of markets, availability of reclaimed water supply, and coordination with existing reclamation efforts (2).

Forty five additional markets were identified in this report as well as 55 existing users. With the existing users, the ultimate demand was projected to be 10,935 AF per year. The users were generally along or south of Palomar Airport Road. The potential users in the northern portion of the City studied in the previous Master Plan were not included.

6.3 Review of Past Markets

The markets identified in the past reports have been reviewed with respect to changes in land use and development plans. Some of the identified developments are now in areas designated as open space for habitat management. Some of the users no longer exist. These users have been deleted.

6.4 Phase II Potential Markets

Other new markets have been identified through review of the City's Local Facility Master Plans, specific development plans, and review of potential users from maps.

Potential Users

From the overall review, an updated list of existing and potential users has been developed. This is reported in Table 6.1. The table provides an identification number, the location by Local Facility Management Zone, the user's name and type of use, irrigated acreage, use factor, and ultimate demand in acre-feet per year.

The user numbers include an alpha character that denotes the type of use. These are as follows:

<u>Designation</u>	<u>Type of Use</u>
A	Agricultural
C	Commercial/Industrial Landscape Irrigation
G	Golf Course
I5	Freeway Median and Right of Way
L	General Irrigation
P	Parks
R	Residential Irrigation--Slopes and Medians.
S	Schools

All of the uses identified are for irrigation of turf and landscaping.

The users are identified by user identification number on Figure 6.1.

Potential Market Size

The total potential market has been identified at 11,020 acre-feet per year. Considering that 18 percent of the demand is expected to occur in the peak month, the potential demand is 21 million gallons per day. This is essentially equal to the potential demand identified in the 1990 Master Plan (1).

OCEANSIDE

OCEANSIDE

VISTA

SAN MARCOS

ENCINITAS

ENCINITAS

Pacific

Ocean

Legend

- EXISTING USER
- POTENTIAL USER
- USER NUMBER
- USER TYPE
- A AGRICULTURE
- C COMMERCIAL
- G GOLF COURSE
- I INDUSTRIAL
- L LANDSCAPING
- P PARKS
- R RESIDENTIAL
- S SCHOOL
- I5 INTERSTATE 5



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

EXISTING AND POTENTIAL
RECLAIMED WATER USERS

FIGURE 6.1



CITY OF TAMPA, FLORIDA - WATER UTILITIES DEPARTMENT												
WATER UTILITY - WATER MAINS - 15" DIAMETER												
PROJECT ID	PROJECT NAME	LOCATION	STATUS	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)	ESTIMATED COST (\$)
P-10	4	ALTA MIRA COMMUNITY PARK	LANDSCAPE	ULTIMATE	33.60	2.50	84.00	4,527.64	4.04	0.162	0.195	0.504
P-11	9	SO. CARLSBAD BEACH ST. PARK	LANDSCAPE	ULTIMATE	2.00	1.88	3.76	4,531.40	4.05	0.007	0.008	0.026
P-12	20	SPECIAL USE AREA	LANDSCAPE	ULTIMATE	3.20	2.50	8.00	4,539.40	4.05	0.015	0.019	0.056
P-13	17	ALGA NORTE COMMUNITY PARK	LANDSCAPE	ULTIMATE	28.00	2.50	70.00	4,608.40	4.11	0.135	0.162	0.487
P-14	18	CARRILLO RANCH PARK	LANDSCAPE	ULTIMATE	14.80	2.50	37.00	4,646.40	4.15	0.071	0.086	0.257
P-15	6	LA COSTA CANYON PARK	LANDSCAPE	ULTIMATE	1.30	3.00	3.90	4,650.30	4.15	0.008	0.008	0.027
P-16	11	STAGECOACH PARK	LANDSCAPE	ULTIMATE	26.00	3.00	78.00	4,728.30	4.22	0.151	0.181	0.542
P-19	19	ZONE 19 PARK	LANDSCAPE	ULTIMATE	5.00	3.00	15.00	4,743.30	4.23	0.029	0.035	0.104
P-20	1	LAGUNA STATE PARK	LANDSCAPE	ULTIMATE	2.10	3.00	6.30	4,749.60	4.24	0.012	0.015	0.044
P-21	1	PARK STATION-PARK PLACE	LANDSCAPE	ULTIMATE	2.00	2.50	5.00	4,754.60	4.24	0.010	0.012	0.035
P-22	1	HOSP GROVE PARK	LANDSCAPE	ULTIMATE	5.00	2.50	12.50	4,767.10	4.26	0.024	0.029	0.087
P-23	5	POINSETTA PARK-(L.R. HUBBARD)	LANDSCAPE	EXISTING			88.25	4,855.35	4.33	0.170	0.204	0.613
R-01	1	AVENUES OF THE SKY - RESIDENTIAL	LANDSCAPE	ULTIMATE	3.90	2.50	9.75	4,885.10	4.34	0.019	0.023	0.068
R-02	1	PUEBLO DE ORO RESIDENTIAL	LANDSCAPE	ULTIMATE	5.92	2.50	14.80	4,879.90	4.36	0.029	0.034	0.103
R-03	1	THE GROVE	LANDSCAPE	ULTIMATE	4.00	2.50	10.00	4,889.90	4.37	0.019	0.023	0.070
R-04	1	RISING GLENBREWNTWOOD HILLS - RESIDENTIAL	LANDSCAPE	ULTIMATE	13.54	2.50	33.85	4,923.75	4.40	0.065	0.078	0.235
R-05	1	MAR Y MARTINEZ	LANDSCAPE	ULTIMATE	4.60	2.50	11.50	4,935.25	4.41	0.022	0.027	0.080
R-06	25	RESIDENTIAL	LANDSCAPE	ULTIMATE	48.00	2.50	120.00	5,055.25	4.51	0.232	0.278	0.834
R-07	7	THE KNOLL/STRAIS RESIDENTIAL	LANDSCAPE	ULTIMATE	22.00	2.50	55.00	5,110.25	4.56	0.106	0.127	0.382
R-08	2	FALCON HILLS/SUMMIT RESIDENTIAL	LANDSCAPE	ULTIMATE	6.35	2.50	15.88	5,126.12	4.58	0.031	0.037	0.110
R-09	7	CALAVERA (THE CREST) RESIDENTIAL	LANDSCAPE	ULTIMATE	5.20	2.50	13.00	5,139.12	4.59	0.025	0.030	0.090
R-10	7	THE VILLAS RESIDENTIAL	LANDSCAPE	ULTIMATE	6.02	2.50	15.05	5,154.17	4.60	0.029	0.035	0.105
R-11	7	CALAVERA HILLS - VILLAGE Q	LANDSCAPE	ULTIMATE	10.24	2.50	25.60	5,179.77	4.62	0.049	0.059	0.178
R-12	7	CALAVERA HILLS - VILLAGE T	LANDSCAPE	ULTIMATE	29.16	2.50	72.90	5,252.67	4.69	0.141	0.169	0.507
R-13	7	CALAVERA CAPE	LANDSCAPE	ULTIMATE	9.00	2.50	22.50	5,275.17	4.71	0.043	0.052	0.156
R-14	14	RESIDENTIAL	LANDSCAPE	ULTIMATE	34.00	2.50	85.00	5,360.17	4.78	0.164	0.197	0.591
R-15	2	TAMARACK POINTE	LANDSCAPE	ULTIMATE	24.00	2.50	60.00	5,420.17	4.84	0.116	0.139	0.417

Parcel ID	Owner	Address	Area (Acres)	Volume (cu ft)	Weight (lb)	Value (\$)	Notes						
R-16	7	CALAVERA HILLS COLONY	LANDSCAPE	ULTIMATE	12.60	2.50	31.50	5,451.67	4.87	0.061	0.073	0.219	152.0
R-17	15	CARLSBAD HIGHLANDS RESIDENTIAL	LANDSCAPE	ULTIMATE	52.60	2.50	131.50	5,593.17	4.98	0.254	0.305	0.914	634.7
R-18	1	PALISADES POINT	LANDSCAPE	ULTIMATE	8.90	2.50	22.00	5,605.17	5.00	0.042	0.051	0.153	106.2
R-19	1	TELESCOPE POINT RESIDENTIAL	LANDSCAPE	ULTIMATE	5.20	2.50	13.00	5,618.17	5.02	0.025	0.030	0.090	62.8
R-20	1	SKYLINE ESTATES RESIDENTIAL	LANDSCAPE	ULTIMATE	7.30	2.50	18.25	5,636.42	5.03	0.035	0.042	0.127	88.1
R-21	1	LAGUNA RIVARA RESIDENTIAL	LANDSCAPE	ULTIMATE	5.80	2.50	14.50	5,650.92	5.04	0.028	0.034	0.101	70.0
R-22	14	RESIDENTIAL	LANDSCAPE	ULTIMATE	76.00	2.50	190.00	5,840.92	5.21	0.367	0.440	1.321	917.1
R-23	8	KELLY RANCH	LANDSCAPE	ULTIMATE	86.60	2.50	216.50	6,057.42	5.41	0.418	0.502	1.505	1045.0
R-24	24	EVANS POINT RESIDENTIAL	LANDSCAPE	ULTIMATE	25.60	2.50	64.00	6,121.42	5.46	0.124	0.148	0.445	308.9
R-25	15	RANCHO DEL CERRO RESIDENTIAL	LANDSCAPE	ULTIMATE	52.80	2.50	132.00	6,253.42	5.58	0.255	0.306	0.918	637.2
R-26	15	RESIDENTIAL	LANDSCAPE	ULTIMATE	97.00	2.50	242.50	6,495.92	5.80	0.468	0.562	1.686	1170.5
R-27	4	SEAGATE VILLAGE RESIDENTIAL	LANDSCAPE	ULTIMATE	10.60	2.50	26.50	6,522.42	5.82	0.051	0.061	0.184	127.9
R-28	20	EMERALD RIDGE RESIDENTIAL	LANDSCAPE	ULTIMATE	9.80	2.50	24.00	6,548.42	5.84	0.046	0.056	0.167	115.8
R-29	5	LAUREL TREE	LANDSCAPE	ULTIMATE	12.19	2.50	30.48	6,576.90	5.87	0.059	0.071	0.212	147.1
R-30	20	COBBLESTONE SEA VILLAGE	LANDSCAPE	ULTIMATE	16.60	2.50	41.50	6,618.40	5.91	0.080	0.096	0.288	200.3
R-31	4	ALTA MIRA RESIDENTIAL	LANDSCAPE	ULTIMATE	20.00	2.50	50.00	6,668.40	5.95	0.097	0.116	0.348	241.3
R-32	20	RESIDENTIAL	LANDSCAPE	ULTIMATE	20.00	2.50	50.00	6,718.40	6.00	0.097	0.116	0.348	241.3
R-33	20	SAMBI	LANDSCAPE	ULTIMATE	13.80	2.50	34.50	6,752.90	6.03	0.067	0.080	0.240	166.5
R-34	20	VISTA DEL MAR	LANDSCAPE	ULTIMATE	7.00	2.50	17.50	6,770.40	6.04	0.034	0.041	0.122	84.5
R-35	20	OCEAN BLUFF	LANDSCAPE	ULTIMATE	6.20	2.50	15.50	6,785.90	6.06	0.030	0.036	0.108	74.8
R-36	20	MARINERS POINT	LANDSCAPE	ULTIMATE	14.00	2.50	35.00	6,820.90	6.09	0.068	0.081	0.243	168.9
R-37	20	RESIDENTIAL	LANDSCAPE	ULTIMATE	34.40	2.50	86.00	6,906.90	6.17	0.166	0.199	0.598	415.1
R-38	4	HARBOR POINT HOMES	LANDSCAPE	ULTIMATE	11.40	2.50	28.50	6,935.40	6.19	0.055	0.066	0.198	137.6
R-39	4	SEACREST - RESIDENTIAL	LANDSCAPE	ULTIMATE	2.79	2.50	6.98	6,942.37	6.20	0.013	0.016	0.048	33.7
R-40	4	VISTA PACIFICA/SHEA PINES	LANDSCAPE	ULTIMATE	9.61	2.50	24.03	6,968.40	6.22	0.046	0.056	0.167	116.0
R-41	20	RESIDENTIAL	LANDSCAPE	ULTIMATE	16.20	2.50	40.50	7,006.90	6.25	0.078	0.094	0.282	195.5
R-42	9	SAMMIS PH. II	LANDSCAPE	ULTIMATE	12.28	2.50	30.70	7,037.60	6.28	0.059	0.071	0.213	148.2
R-43	9	SAMMIS PH. III	LANDSCAPE	ULTIMATE	10.00	2.50	25.00	7,062.60	6.30	0.048	0.058	0.174	120.7

R-44	9	SAMMIS PH. I	LANDSCAPE	ULTIMATE	24.12	2.50	60.30	7,122.90	6.36	0.116	0.140	0.419	291.1
R-45	19	AVIARA RESIDENTIAL DEVELOPMENT	LANDSCAPE	EXISTING			302.96	7,425.56	6.63	0.584	0.701	2.104	1460.9
R-45A	19	ALDEA AT AVIARA	LANDSCAPE	EXISTING			6.50	7,432.06	6.63	0.013	0.015	0.045	31.4
R-45B	19	AVIARA SEVEN	LANDSCAPE	EXISTING			3.66	7,435.72	6.64	0.007	0.008	0.025	17.7
R-45C	19	BARRATT RESIDENTIAL	LANDSCAPE	EXISTING			5.60	7,441.32	6.64	0.011	0.013	0.039	27.0
R-45D	19	AVOCET RESIDENTIAL	LANDSCAPE	EXISTING			4.13	7,445.45	6.65	0.008	0.010	0.029	19.9
R-46	21	RESIDENTIAL	LANDSCAPE	ULTIMATE	72.00	2.50	180.00	7,625.45	6.61	0.346	0.417	1.251	868.8
R-46	20	RESIDENTIAL	LANDSCAPE	ULTIMATE	34.00	2.50	85.00	7,710.45	6.88	0.164	0.197	0.591	410.3
R-47	10	LA COSTA RESIDENTIAL--NW	LANDSCAPE	ULTIMATE	149.00	2.50	372.50	8,082.95	7.22	0.719	0.863	2.589	1796.0
R-48	17	CARILLO RANCH	LANDSCAPE	ULTIMATE	42.00	2.50	105.00	8,187.95	7.31	0.203	0.243	0.730	665.0
R-48	18	CARILLO RANCH	LANDSCAPE	ULTIMATE	22.98	2.50	57.45	8,245.40	7.36	0.111	0.133	0.399	400.0
R-50	6	MEADOWCREST RESIDENTIAL	LANDSCAPE	ULTIMATE	3.30	2.50	8.25	8,253.65	7.37	0.016	0.018	0.057	39.8
R-51	6	MEADOWLANDS RESIDENTIAL	LANDSCAPE	ULTIMATE	5.60	2.50	14.00	8,267.65	7.38	0.027	0.032	0.097	67.6
R-52	6	ALGA HILLS RESIDENTIAL	LANDSCAPE	ULTIMATE	12.80	2.50	32.00	8,289.65	7.41	0.062	0.074	0.222	154.5
R-53	11	LA COSTA RESIDENTIAL--NE	LANDSCAPE	ULTIMATE	68.00	2.50	170.00	8,469.65	7.58	0.328	0.384	1.182	820.6
R-54	6	FAIRWAY RESIDENTIAL	LANDSCAPE	ULTIMATE	8.20	2.50	20.50	8,480.15	7.58	0.040	0.047	0.142	99.0
R-55	23	GREEN VALLEY DEVELOPMENT	LANDSCAPE	ULTIMATE	62.00	2.50	155.00	8,645.15	7.72	0.299	0.359	1.077	748.2
R-56	12	LA COSTA RESIDENTIAL -- SW	LANDSCAPE	ULTIMATE	71.00	2.50	177.50	8,822.65	7.88	0.343	0.411	1.234	856.8
R-57	12	LA COSTA DEL SUR RESIDENTIAL	LANDSCAPE	ULTIMATE	22.20	2.50	55.50	8,878.15	7.93	0.107	0.129	0.386	267.9
R-58	11	PARKVIEW W. DEVELOPMENT	LANDSCAPE	ULTIMATE	5.20	2.50	13.00	8,891.15	7.94	0.025	0.030	0.090	62.8
R-59	11	LA COSTA RESIDENTIAL -- SE	LANDSCAPE	ULTIMATE	130.00	2.50	325.00	9,216.15	8.23	0.628	0.753	2.259	1568.8
R-60	11	VISTA SANTA FE -- C	LANDSCAPE	ULTIMATE	11.78	2.50	29.45	9,245.60	8.25	0.057	0.068	0.205	142.2
R-61	11	PARKVIEW E. DEVELOPMENT	LANDSCAPE	ULTIMATE	1.60	2.50	4.00	9,249.60	8.26	0.008	0.009	0.028	19.3
R-62	11	VISTA SANTA FE -- B	LANDSCAPE	ULTIMATE	7.08	2.50	17.70	9,267.30	8.27	0.034	0.041	0.123	85.4
R-63	11	SHELLY COURT	LANDSCAPE	ULTIMATE	48.80	2.50	122.00	9,389.30	8.38	0.236	0.283	0.848	588.9
R-64	11	RICE PROPERTY	LANDSCAPE	ULTIMATE	18.20	2.50	45.50	9,434.80	8.42	0.088	0.105	0.316	219.6
R-65	11	RANCHO VERDE DEVELOPMENT	LANDSCAPE	ULTIMATE	43.20	2.50	108.00	9,542.80	8.52	0.209	0.250	0.751	521.3
R-66	6	RESIDENTIAL	LANDSCAPE	ULTIMATE	15.00	2.50	37.50	9,580.30	8.55	0.072	0.087	0.261	181.0

RECLAIMED WATER SOURCES

This section describes the potential sources of reclaimed water for future Phase II development.

7.1 Existing Reclamation Plants

Three member agencies within the Encina Wastewater Authority own water reclamation plants. They are:

Agency	Water Reclamation Plant	Capacity (mgd)
Buena Sanitation District	Shadowridge	1.16
Leucadia County Water District	Gafner	0.75
Vallecitos Water District	Meadowlark	2.00

Their locations were shown on Figure 3.1. Each of the plants produces effluent that meets the California Administrative Code, Title 22 requirements for unrestricted use. Screenings and sludge are returned to the sewers for subsequent disposal at the Encina Water Pollution Control Facility (EWPCF).

7.2 Meadowlark Water Reclamation Plant

This plant was completed in 1984. It is located at 2310 South Rancho Sante Fe Road in San Marcos. Processes include screening, rotating biological contactors, sedimentation, coagulation, filtration and disinfection. The disinfection is accomplished using chlorine and chlorine contact basins. Screenings and secondary sludge are pumped through a dedicated 6-inch line that connects to the District's land outfall for processing at the EWPCF.

The Vallecitos Water District applied for and received a re-rating of the plant to 2.25 mgd. The additional 0.25 mgd will provide flows to convey primary and secondary sludges to the EWPCF. The net capacity for reclamation will be 2.0 mgd.

The Meadowlark plant could be expanded to 5.0 mgd (6). This would require somewhat higher organic loadings on the rotating biological contactors. In any event, the site layout can easily handle 4 mgd. In addition to the treatment expansion, the Vallecitos Water District Lift Station No. 1 would be enlarged to convey a portion of the wastewater from the San Marcos Drainage Basin to the Meadowlark plant. The ultimate flow from the Meadowlark drainage basin is projected to be 3.0 mgd, but this flow may not occur for some time. The maximum flow to the plant is 3.0 mgd without major upgrades to Lift Station No. 1 and the force main. The failsafe line capacity would also need expansion with a new or parallel line.

7.3 Shadowridge Water Reclamation Plant

Shadowridge can currently provide up to 1.0 mgd of reclaimed wastewater it is located at 2525 Lupine Hill in Vista. The remaining 0.16 mgd of treatment capacity represents the flow needed to convey the screenings and sludge through the sewer to Encina.

The processes at Shadowridge are essentially the same as at Meadowlark, except that reverse osmosis was constructed to demineralize the effluent to meet total dissolved solids limits for irrigation. The reverse osmosis units were never operated and now have been abandoned.

The effluent is used to irrigate the Shadowridge golf course. During the peak irrigation season, all of the plant capacity is utilized for this purpose. The excess effluent is discharged into the failsafe line.

Though expandable to 2.5 mgd based on available site, there are no current plans to do this.

7.4 Gafner Water Reclamation Plant

The Gafner plant includes screening, comminution, primary sedimentation, trickling filters, secondary sedimentation, coagulation, reactor clarifier, filtration, and disinfection. It is located at 1960 LaCosta Avenue in Carlsbad. It is not expected that this plant would be expanded in the future. The treated effluent is used to irrigate the south course at the La Costa Resort and Spa.

There is an 800,000 gallon bladder reservoir that can be used for effluent equalization or storage. There is an existing digester that is not in use. As discussed above, all sludge is treated at the EWPCF.

The Leucadia County Water District is considering abandoning the primary and secondary treatment facilities at Gafner. Secondary effluent would be supplied by the EWPCF through the failsafe line. The tertiary facilities would remain in operation and might be expanded.

7.5 Failsafe Lines

When the treated flows exceed the rate of reclamation use, the effluent is conveyed to the Encina Ocean Outfall (EEO) System through the failsafe lines. The alignment and size of these pipelines is shown on Figure 3.1 also.

The failsafe lines join at a pressure manhole adjacent to the surge chamber at the EWPCF. A pipe connects the manhole to the surge chamber where the reclaimed flows mix with the EWPCF effluent and discharge into the ocean outfall.

7.6 Encina Water Pollution Control Facility

The City of Carlsbad is one of six member agencies that own and operate the EWPCF and the EOO systems. All of the wastewater generated within Carlsbad is treated at this facility. The member agencies own the facilities through a joint powers agreement. A second agreement established the Encina Wastewater Authority to operate and administer the joint system. The member agencies are the City of Carlsbad, the Buena Sanitation District, the City of Encinitas, Leucadia County Water District, Vallecitos Water District, and the City of Vista. Each member agency is responsible for their own wastewater collection systems.

Description

The EWPCF is located on Avenida Encinas, just west of Interstate 5 and south of Palomar Airport Road, in the City of Carlsbad. The location is shown on Figure 3.1. The treatment plant consists of a headworks, primary treatment, activated sludge secondary treatment, and solids handling. A portion of the treated effluent is reclaimed and used for irrigation of the freeway right-of-way, on-site landscaping, and internal plant uses.

Treatment Capacity

With the completion of the Phase IV Expansion, the capacity of the EWPCF is 36 mgd liquid and 38 mgd solids. Phase IV started construction in 1989 and was finished in April of 1992. The project included an additional headworks bar screen, primary clarifiers, aeration basins, secondary clarifiers, a dissolved air flotation thickener, anaerobic digesters, and belt press sludge dewatering. A plant layout and design criteria are included in Appendix E.

However, with expansions and conversion of certain units, the plant is expandable to an average annual flow of approximately 53.7 mgd as reported in the Encina "2020 Facility Plan Update" (7). The total member agency flow projections, including the City of Carlsbad, is 53.19 mgd. This is the ultimate flow projection as summarized in the "Encina Ocean Outfall Disposal Capacity Report" (8).

Solids Handling Capacity

The upstream reclamation plants discharge their sludges back to the sewer system for ultimate digestion, dewatering, and disposal at the EWPCF. The plants that discharge sludges include Shadowridge owned by the Buena Sanitation District, Meadowlark owned by the Vallecitos Water District, and Gafner owned by the Leucadia County Water District. The equivalent solids handling capacity is 38 mgd to account for 2 mgd of upstream reclamation. This is the combined capacity of Shadowridge and Gafner. The Vallecitos Water District's capacity is included in their total liquid/solids ownership.

The solids handling at the EWPCF can be expanded to handle total equivalent solids flows with the addition of a dissolved air flotation thickener and two anaerobic digesters.

Additional Property

In December 1995, the Encina Wastewater Authority completed purchase of a 32 acre site immediately south of the EWPCF. This is the net buildable area taking into account easements and set backs. The asset value is \$4,529,205. The City of Carlsbad has title of the property for the benefit of the member agencies. This site, currently vacant, could be used for multiple purposes including a new Administration Building for Encina as well as a water reclamation plant for a member agency. The District has completed preliminary site planning for a 18 mgd Title 22 treatment facility (9). The source of water would be secondary effluent from the EWPCF. Processes would include coagulation/flocculation, filtration, disinfection, and demineralization for a portion of the effluent to produce a product with a total dissolved solids (TDS) content less than 1,000 mg/l.

7.7 Design Criteria

Design criteria and process schematics for each of the above plants is given in Appendix E.

7.8 Storage

The District currently utilizes Reservoirs D-1 and D-2 for storage. The total storage volume is 2.5 million gallons (mg). Storage is needed to meet the diurnal demands. The reclaimed water is produced on a 24 hour basis, with some variation during the day. However, the reclaimed water should be delivered over an 8 hour period beginning at 10:00 pm and ending at 6:00 am. The irrigation schedule can be changed. To ensure sufficient supply the diurnal storage reservoirs need to be full at the start of the irrigation period. This section summarizes other storage opportunities.

Mahr Reservoir

South of the plant is the 54 mg Mahr Reservoir. This is an unlined-uncovered reservoir that has been used for storage of reclaimed water. Algae growth has been a past problem with respect to use of the stored effluent for irrigation. As part of the Carlsbad Municipal Water District's Encina Basin Project-Phase I, a micro screening facility was constructed to alleviate this problem. The reservoir can also be used to reduce peak flows to the EOO.

The reservoir is located at a hydraulic grade of 570 feet above mean sea level. With a 54 mg volume, it could help to reduce the impact of peak month demands. It would probably require lining, covering, and relocation of the micro screens.

Lake Calavera

Lake Calavera is located in the northeast corner of the City. It was constructed in 1940 as a water storage reservoir. The only source of potable water were wells in the San Luis Rey River in Oceanside. The well output could not keep up with the higher summer demands. The reservoir was used to store water during the low demand winter months for subsequent use in the summer. A

water filtration plant was also constructed. The facility was abandoned when the first Colorado River was imported in 1957.

The reservoir has a capacity of 520 acre-feet with a spillway elevation of 216.5 feet. There is an overflow that limits the normal water surface elevation at about elevation 209. The City also has the water rights to the runoff into the reservoir of 150 acre-feet per year.

The estimated watershed area is 1,420 acres. Much of this remains undeveloped. Using rainfall records kept at the Kelly Ranch from 1930 to 1977 and at the District offices from 1977 to 1995, the average rainfall is 14.1 inches per year with at least 7.5 inches falling 90 percent of the years on record. Using a gross runoff coefficient of 0.3 and neglecting runoff from May through October, the runoff into Lake Calavera would average 450 acre-feet per year with at least 244 acre-feet per year being collected 90 percent of the time.

The actual amount of runoff is not known, as no records have been kept. A report done in 1990 concerning water supplies for the Lake Calavera Golf Course estimated the runoff at between 100 to 300 acre-feet per year, but it appears that there was no data substantiating this figure.

In the early 1980's the Lake Calavera Hills Water Reclamation Plant was constructed to serve a development. This 1.2 mgd plant included an oxidation ditch activated sludge process with aerobic digestion and belt press dewatering. The effluent was to be disinfected with chlorine in a contact basin. The facility never went into operation. Portions may be suitable for treatment of the water from Lake Calavera. It is located west of Tamarack Avenue and south of Elm Street. Piping would need to be constructed from the dam to the plant.

Santa Fe I

The Santa Fe I Reservoir is located in the City of San Marcos. It is south of Palomar Airport Road and just east of the City of Carlsbad's city limits. It was the District's first reservoir constructed when imported water became available. It is a 2.5 million gallon, prestressed concrete tank at a hydraulic grade of 660 feet. There is a chlorine booster station associated with the tank.

C Reservoir

The C reservoir is located north of El Camino Real and south of Lake Calavera. This is a 1.5 mg reservoir. This reservoir could be used for diurnal demands. Its base is at an elevation of 392 feet. There is an existing 14-inch steel pipeline connecting the reservoir to El Camino Real at the point of the proposed Cannon Road extension.

7.9 County Water Authority

Another source of water would be untreated water from the County Water Authority. This water can be purchased at a lower cost than treated water. It also has the advantage of lower total dissolved solids than reclaimed water, on the order of 300 to 350 mg/l less. Water would be provided by Pipeline 4 of the Second Aqueduct.

7.10 Ground Water

The potential for local groundwater resources is discussed in the water resources section of this master plan. This section concluded that the resources are small in quantity and the TDS is high. Groundwater is not considered a feasible source.

ALTERNATIVE ANALYSIS

Previous chapters have summarized the District's existing reclamation program, identified potential users, and summarized reclaimed water sources. This chapter identifies Phase II reclamation alternatives. An alternative analysis is also included.

8.1 Phase II Goals

Phase I was based on economically utilizing the existing sources of reclaimed water. These sources included the Vallecitos Water District's Meadowlark Water Reclamation Plant and the Leucadia County Water District's Gafner Water Reclamation Plant. The Title 22 effluent is used through agreements with these two agencies. The peak day capacity from these two plants is currently 2.75 million gallons per day (mgd). The reclaimed water users are generally larger users that could be more easily served based on the location of pre-existing facilities. The largest users are the La Costa Golf Course and Resort, the Aviara Golf Course, and median and slope irrigation within the Aviara Development.

The Phase II goals include:

1. Development of reclaimed water markets that are cost effective;
2. Making use of existing facilities; and
3. Reducing the dependence upon imported water.

The various alternatives discussed do not provide the same amount of reclaimed water. Many are identified to make use of existing facility capacities, utilize logical expansions of the existing water reclamation plants, and develop system storage to reduce treatment requirements during the peak month demand periods. In addition to the existing water reclamation plants, the potential for a new Title 22 plant in connection with the Encina Water Pollution Control Facility (EWPCF) is evaluated. This facility has been discussed in several planning reports. It would be constructed on the 32 acre parcel south of the EWPCF that was purchased for this as well as other uses.

8.2 Conceptual Reclaimed Water Sources

In development of the alternatives, the following sources and facilities have been considered:

Treatment	Capacity
Meadowlark Water Reclamation Plant	3, and 4 mgd
Gafner Water Reclamation Plant	0.75 mgd
Shadowridge Water Reclamation Plant	1.00 mgd
Encina Water Reclamation Plant (new)	Varies with alternative

Seasonal Storage		Volume	
		Million Gallons	Acre Feet
Mahr Reservoir		54	166
Lake Calavera		<u>78</u>	<u>240</u>
	Totals	132	406
Non-Potable Water			
County Water Authority Raw Water		Varies with alternative	

8.3 Seasonal Storage Reservoirs

Lake Calavera and the Mahr Reservoir will be considered to reduce the impact of the peak month demands. The reclaimed market is now limited by the peak demand that occurs in July and August. By storing water in lower demand months, an overall larger market can be served during peak demand periods.

As discussed in Chapter 7, the useable volume in Lake Calavera may be limited to 240 acre-feet or about 78 million gallons. By pumping water to the reservoir in late spring and early summer, this water would then be available over the heaviest irrigation demand periods of July, August and September.

The Mahr Reservoir has a volume of 54 million gallons. The total available seasonal storage is 132 million gallons or 406 acre-feet.

8.4 Diurnal Storage Reservoirs

Currently, the two D Reservoirs provide for diurnal storage. The total available volume is 2.5 million gallons. Also, the ponds on the La Costa Golf Course are used for diurnal storage. The planned Rancho Carlsbad Country Club and City Municipal Golf Course would also be constructed with ponds for diurnal storage.

Other existing reservoirs that might be converted for reclaimed water use are the Santa Fe I with a volume of 2.5 million gallons and Reservoir C with a volume of 1.5 million gallons.

8.5 Meadowlark Water Reclamation

The ultimate service area flow to the Meadowlark Water Reclamation Plant was master planned to 3 mgd. The site may be easily expanded to 4 mgd with the potential expansion to 5.0 mgd. For 5 mgd, the loadings on the rotating biological contractors and chlorine basin would be slightly higher than original design loadings. For higher flows, additional wastewater would be pumped from the Vallecitos Lift Station No. 1 into the reclamation plant.

Meadowlark Expansion

For 3 mgd of reclamation flow, one additional rotating biological contactor (RBC) would have to be constructed. One spare sedimentation basin and one spare filter were constructed with the original plant. These units would be put into service. If one went down for mechanical reasons, the influent into the plant would be decreased for the period of repair. The remaining 2 mgd of capacity would still provide sufficient capacity for the wastewater generated in the Meadowlark Basin as well as provide a substantial continued source of reclaimed water.

The chlorine contact basin provides over 5 hours of contact time at 2 mgd. Two hours of contact time is recommended to meet Title 22 requirements. The contact time at 3 mgd is still over 3 hours. The site plan at 3 mgd is shown on Figure 8.1.

For 4 mgd, a total of four RBCs would be needed; two existing plus two new. Additional sedimentation basins and filters would be constructed. The original chlorine contact basin would still provide over 2 hours of contact time at 4 mgd. The site plan at 4 mgd is given on Figure 8.1, while the design loadings for both 3 and 4 mgd are reported on Table 8.1. This table compares the resulting loadings against the original design criteria or Title 22 criteria.

Table 8.1 Meadowlark Water Reclamation Plant, Expansion Design Loadings Carlsbad Municipal Water District Reclaimed Water Master Plan					
	Existing	No. Required @	Loading		Acceptable Loading
Unit Process	---	3 mgd @ 4 mgd	3 mgd	4 mgd	---
Rotating Biological Contactors	2	3 mgd @ 4 mgd	2 gpd/sf	2 gpd/sf	2 gpd/sf
Sedimentation Tanks	3	3 mgd @ 4 mgd	606 gpd/sf	606 gpd/sf	600 gpd/sf
Filters (1)	3	3 mgd @ 4 mgd	4.6 gpm/sf	4.11 gpm/sf	5 gpm/sf
Chlorine Contact Basin	1	1 mgd @ 1 mgd	3.1 hrs	2.3 hrs	2 hrs
(1) Allows one backwashing					

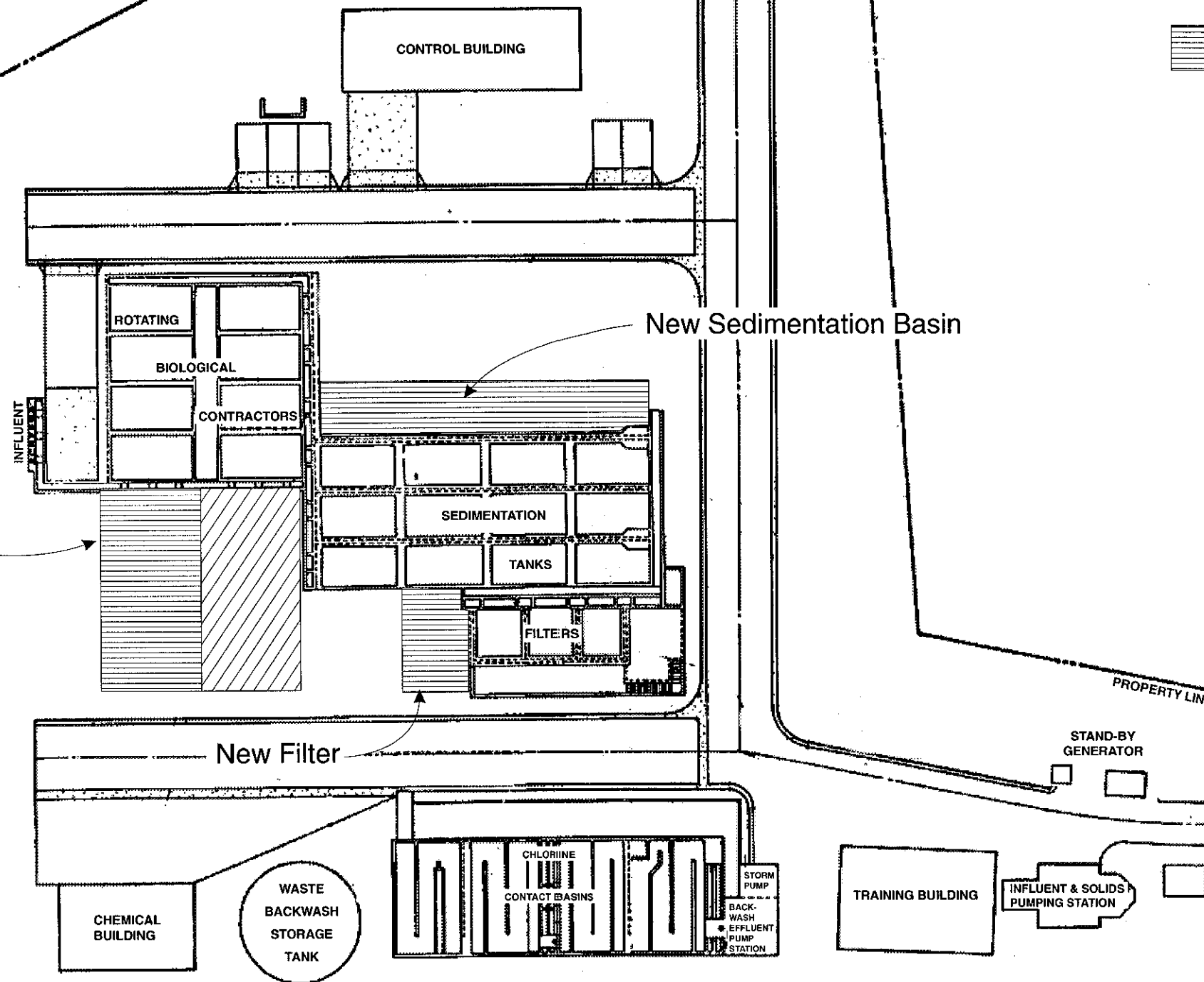
Wastewater Pumping

As discussed previously, the wastewater generated within the Meadowlark Basin was 0.97 mgd in 1995. The remaining flow is pumped into the plant from the Vallecitos Water District's Lift Station No. 1. The buildout flow for the Meadowlark Basin is 3 mgd, but this may not occur for many years. Expanded pumping from Lift Station No. 1 may be needed to provide increased reclamation flows beyond 3 mgd. Also, consideration must be given to capturing low period flows to produce the average daily output. There are three pumps in Lift Station No. 1 with the following characteristics:

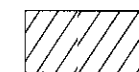
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PROPERTY LINE

New RBC's



Legend



New Facilities for 3 mgd



New Facilities for 4 mgd



**MASTER PLAN UPDATE
MEADOWLARK WRP
SITE PLAN**

FIGURE 8.1

No. Of Pumps	Capacity Each (gpm)	Horsepower
2	850	75
1	550	75

Considering the largest pump out of service, the rated capacity of the pump station is 1,400 gallons per minute or 2 mgd. The pump station output would need to be increased for a 4 mgd rated capacity of the Meadowlark Water Reclamation Plant.

8.6 Gafner Water Reclamation Plant

It is assumed that the Gafner Water Reclamation Plant cannot be expanded due to site and process limitations. It is further assumed that the plant will remain in service for a period of time until reclaimed water sales pay for the loans used to construct the tertiary expansion. Gafner can treat up to 0.75 mgd, and serves the La Costa Resort and Spa. As discussed in Chapter 7, the Leucadia County Water District is considering expanding the tertiary capacity. Only the existing 0.75 mgd covered by the agreement is included in this analysis.

8.7 Shadowridge Water Reclamation Plant

The Shadowridge Water Reclamation Plant now serves the Shadowridge Golf Course. In the summer months, there is no excess reclaimed water available. However, for most months, there would be effluent available that could be diverted from the Buena Failsafe Line. There is an existing agreement between the District and the Buena Sanitation District providing for this diversion. The actual terms of use would be set by a supplemental agreement.

During the winter months, the Shadowridge Water Reclamation Plant discharges secondary effluent to the Encina Ocean Outfall. If the District diverted the water, there would be additional cost to filter and disinfect the effluent. The District would also need to take the disinfected effluent as it comes down the Failsafe Line to prevent chlorine residual violations in the overall Encina effluent.

Based on a peak day demand of 1 mgd for Shadowridge Golf Course and a similar seasonal variation as experienced within the District, the application to the golf course averages 520 acre-feet per year. This appears to be a reasonable upper-end demand. About 550 acre-feet would be available to the District over the entire year. The expected seasonal variation of this supply is given in Table 8.2. The available effluent might be stored in Lake Calavera for use in the peak irrigation demand months of August and September.

Table 8.2 Effluent Available From Shadowridge Carlsbad Municipal Water District Reclaimed Water Master Plan				
Month	% Ave. Demand	Shadowridge Golf Course Demand (mgd)	Remaining Flow (mgd)	Remaining Flow (AF)
Jan	1.64	0.09	0.91	86.6
Feb	0.95	0.06	0.94	81.0
Mar	0.84	0.05	0.95	90.8
Apr	4.93	0.03	0.72	66.4
May	8.12	0.44	0.56	52.9
Jun	11.38	0.64	0.36	32.9
Jul	13.38	0.73	0.27	25.6
Aug	18.37	1.00	0.0	0.0
Sep	16.41	0.93	0.07	0.0
Oct	11.45	0.63	0.37	35.6
Nov	6.98	0.39	0.61	55.8
Dec	5.57	0.30	0.70	66.2
				Remaining (AF) 593
				Use 550
Total demand = 520 AF/Yr				

8.8 Proposed Encina Water Reclamation Plant

The site available for the Encina Water Reclamation Plant is large enough for an 18 mgd facility. This is based on preliminary site evaluations and includes space for storage, equalization, and demineralization (9).

8.9 Process Description

The Encina Water Reclamation Plant would include the following processes:

- Secondary Effluent Pumping -- a pump station would be constructed at the existing EWPCF to intercept secondary effluent flows prior to the outfall booster pump station. A force main would be used to convey the secondary effluent south to the new facility.
- Influent Equalization -- a ballast tank to level out flows to the process. This tank may be used to store secondary effluent flows with lower TDS concentrations. This concept is discussed in further evaluations.

- Coagulation and Flocculation -- mixing processes to aggregate the secondary effluent suspended solids into larger, filterable flocs. Alum and polymer would be added to the effluent at this step.
- Granular Media Filtration -- gravity filters to remove the suspended solids.
- Disinfection -- disinfection of the filtered effluent to kill coliform and virus. The analysis is based on the use of ultraviolet irradiation. This process eliminates the need for gaseous chlorine, a potentially hazardous substance.
- Demineralization -- reverse osmosis of a portion of the flow. This occurs upstream of the disinfection process. Cartridge filters are used upstream of the reverse osmosis membranes to prevent fouling and extend their life.
- Backwash Equalization -- equalization of backwash and brine flows from the filters and the reverse osmosis units, respectively. These flows would be discharged back to the ocean outfall.
- Finished water Storage -- diurnal storage of the product water.

A schematic of the process is given on Figure 8.2. The capacity of the plant would depend on the given alternative.

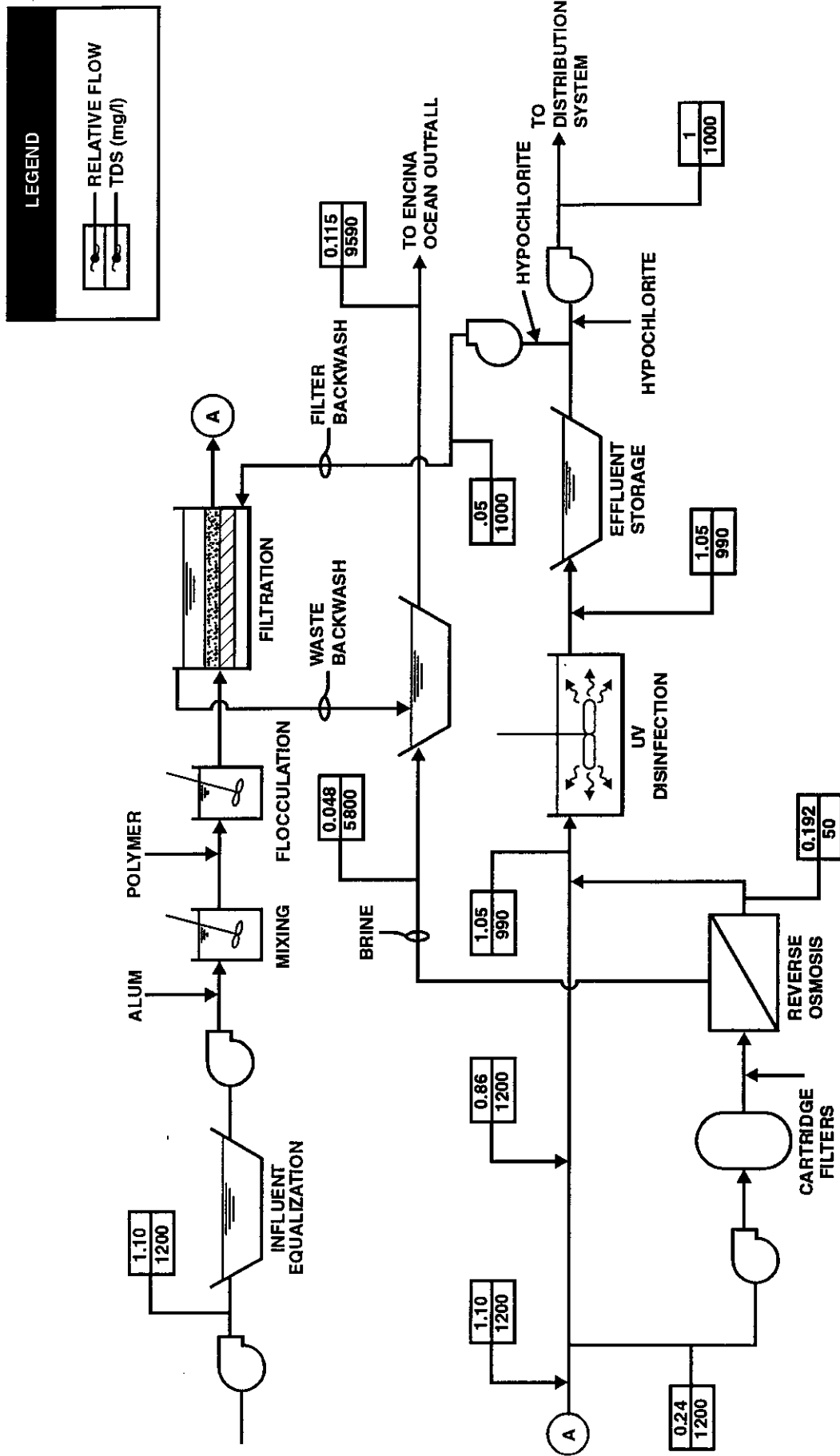
The various sources are combined with respect to the location and demand of existing and potential users. The ultimate selection of Phase II will be based on capital cost, available funds, and resulting cost of reclaimed water as compared to other sources.

8.10 Potential Demands

The existing reclaimed water demands utilize the entire 2.75 mgd capacity of the combined Meadowlark and Gafner flows. Potential demands were summarized in Chapter 6. For the entire reclaimed water service area, the potential annual demand is approximately 11,300 acre-feet with a peak month demand of 21.8 mgd.

8.11 Quality Requirements

At this time, the identified users include turf and landscape irrigation. As reviewed in Chapter 5, the effluent quality from the Meadowlark Reclamation Plants is acceptable for these users. The effluent from the EWPCF and the Gafner Water Reclamation Plant have a higher total dissolved solids (TDS) than the other two plants. For the purpose of this analysis, demineralization will be included for treating the EWPCF effluent. A target concentration of 1,000 mg/L will be utilized.



CARLSBAD MUNICIPAL WATER DISTRICT MASTER PLAN UPDATE ENCINA WRP FLOW SCHEMATIC

FIGURE 8.2



Also as discussed in Chapter 5, the EWPCF may implement source control for industrial dischargers with high TDS concentration. The current deadline for compliance is May 1, 1997. If implemented, the EWPCF effluent TDS concentration will approach the 1,000 mg/L goal. The alternative analysis will include a sensitivity comparison of reclaimed water costs with and without demineralization.

8.12 Alternative Development Criteria

In addition to the quality issues discussed above, the following criteria has been used to develop the alternatives:

Seasonal Demand	Per Figure 3.3, maximum month usage is in September. Eighteen percent of annual demand occurs in this month.
Irrigation Schedule	10:00 pm to 6:00 am
Minimum Pressure	40 psi
Maximum Pressure	100 psi
Maximum Pipe Velocity	8 feet per second
Pressure Zones	Generally follow the potable water system
Treatment	Title 22
Demineralization	Reverse Osmosis--50 mg/L product water, 80% recovery
Storage	Minimum storage to meet diurnal variations

8.13 Alternative Description

Based on the potential market and the sources of reclaimed water, possible Phase II alternatives are listed in Table 8.3. The sources of water, peak month supply capabilities, and the annual available quantity is given for each of the alternatives. A more detailed description of the alternatives is given below.

Table 8.3 Reclamation Alternatives Carlsbad Municipal Water District Reclaimed Water Master Plan					
Alternative Development					
Alternative	Driven By	Reclaimed Sources	Reclaimed Water Capacity (mgd)	Peak Month Flow (mgd)	Average Annual Demand (AF/YR)
1.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark 	0.75 3.00	3.75	2,000
2.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark 	0.75 4.00	4.75	2,520
3.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark Lake Calavera and Mahr Seasonal Storage 	0.75 3.00 2.15	5.90	3,160

Table 8.3 Reclamation Alternatives Carlsbad Municipal Water District Reclaimed Water Master Plan					
Alternative Development					
Alternative	Driven By	Reclaimed Sources	Reclaimed Water Capacity (mgd)	Peak Month Flow (mgd)	Average Annual Demand (AF/YR)
4.	Treatment	<ul style="list-style-type: none"> Gafner Meadowlark Lake Calavera and Mahr Seasonal Storage 	0.75 4.00 2.30	7.05	3,780
5.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina 	0.75 2.00 17.2	20.00	11,020
6.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 2.00 15.00 2.30	20.00	11,020
7.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 3.00 13.5 2.3	19.50	9,780
8.	Market	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP Lake Calavera and Mahr Seasonal Storage 	0.75 4.00 11.50 2.30	18.50	9,780
9.	Supply	<ul style="list-style-type: none"> Gafner Meadowlark Encina WRP 	0.75 3.0 4.25	8.0	4,480
10.	Supply	<ul style="list-style-type: none"> Gafner Meadowlark Mahr Seasonal Storage 	0.75 4.00 0.90	5.65	2,860

Alternative No. 1

This alternative would provide a small increase in reclamation capacity by expanding the treatment capacity of the Meadowlark WRP from 2.0 mgd to 3.0 mgd. This would entail construction of a new RBC and adding new pump station capacity.

This alternative would utilize the twin 'D' tanks for diurnal storage. The 'D' tanks have a combined capacity of 2.5 million gallons. Based on Meadowlark WRP's capacity to fill the tanks during non-irrigation hours, the storage tanks can supply a flow of about 4,200 gpm or 6.0 mgd during the peak eight hour irrigation period. The peak reclaimed water flow rate from the storage tanks and Meadowlark WRP would be 6,300 gpm or 9.0 mgd. The total annual reclaimed water resource from Gafner and Meadowlark WRPs would be about 2,000 acre-ft.

The flows would serve existing users and new users in the vicinity of the existing distribution system. The backbone of the distribution lines would consist of the existing distribution system. Reclaimed water would be pumped from Meadowlark WRP to the El Camino Pump Station. An expanded and improved El Camino Pump Station would be used to serve the selected new users and all existing users as well as to fill the 'D' Tanks. The new pump would have similar capacity as the existing ones. The El Camino Pump Station is already fitted to accept one new pump.

The Gafner WRP would continue to produce 0.75 mgd of reclaimed water for use on the La Costa Golf Course, exclusively. The reclaimed water distribution system would remain the same as shown on Figure 3.1.

Alternative No. 2

Alternative No. 2 is similar to Alternative No. 1 except that capacity at the Meadowlark WRP would be increased by 2.0 mgd to 4.0 mgd. The increase in capacity would require a fourth RBC, another secondary sedimentation basin, and another effluent filter.

The peak reclaimed water flow from the diurnal storage tanks and Meadowlark WRP would increase to 8,000 gpm or 11.5 mgd. The Gafner WRP would continue to produce 0.75 mgd of reclaimed water. This water would be used by the La Costa Golf Course, exclusively. The total annual reclaimed water resource would be about 2,500 acre-ft.

The flows would serve the users described in Alternative No. 1 and other new users. The distribution system would be the same as Alternative No. 1, except that one more 65 HP pump would be added to the El Camino Pump Station. The pump station would require significant modifications in order to accommodate one more pump. The pump would also have similar capacity as the existing pumps. The distribution system would be same as shown on Figure 3.1.

Alternative No. 3

This alternative takes advantage of the seasonal storage available in Lake Calavera and Mahr Reservoir. By having these reservoirs full by the end of June, they can then provide flows during the highest demand months of July, August, and September. While only 406 acre feet of storage is available, by providing this flow in the peak month, the total reclaimed water that can be applied from all sources increases by a factor of about 40 percent.

The Mahr Reservoir would be filled with flows from the Meadowlark Water Reclamation Plant in April and May. The source of water for Lake Calavera could be watershed runoff or alternatively flows from the Shadowridge WRP. In low rainfall years, the supply would need to be augmented by the Shadowridge or Meadowlark Water Reclamation Plant.

The Mahr Reservoir should be lined and covered for optimal water quality. The estimated storage volume for Lake Calavera assumes a minimum pool, and no lining is foreseen. Due to the time that the water would be stored, screening of the return water as well as chlorine residual boosting with hypochlorite would be included.

For Alternative No. 3, the Meadowlark Water Reclamation Plant would be expanded to 3 mgd. Gafner would continue to supply La Costa at a rate of 0.75 mgd. The total resource available is estimated at 3,160 acre feet.

Users have been identified that would match the available reclaimed water supply. The market has been selected to make use of existing distribution facilities where possible as well as make use of the available hydraulic head in the seasonal reservoirs. The system components for this alternative are shown on Figure 8.3.

The distribution system would consist of the existing system. The existing abandoned 20-inch water line along El Camino Real would be used.

The seasonal storage would add about 4,500 gpm or 6.5 mgd of peak flow capacity. The hydraulic grade line (HGL) for Lake Calavera is 209 ft. A pump station would be required to pump the water from Lake Calavera to the users in the 500 to 600 feet pressure zone. The distribution line for this service area would consist of an 18-inch pipe. The existing 20-inch abandoned water line along El Camino Real would be used as part of the distribution system. The Mahr reservoir has a HGL of 570 feet. Distribution to the lower La Costa area users (500 feet pressure zone) would be by gravity flow. The distribution network would consist of 12-inch and 8-inch distribution lines. The lower La Costa area would also be connected to the existing distribution system at El Camino Real. The distribution system for this alternative is shown in Figure 8.3.

Alternative No. 4

Alternative No. 4 combines the treatment elements of Alternative No. 2 with the seasonal storage elements of Alternative No. 3. In addition, diurnal storage is used to increase the peak flow capacity. This results in the capability to provide a peak flow rate of 13,000 gpm or 18.7 mgd and a total annual application of 3,780 acre-feet.

During peak flow the Meadowlark WRP would supply 4.0 mgd, diurnal storage at the 'D' Tanks would supply a flow of 4.3 mgd or 3,000 gpm, the Santa Fe I Storage Tank would provide a flow of 2.8 mgd or 2,000 gpm, and Lake Calavera and Mahr Reservoir would supply a flow rate of 6.9 mgd or 4,800 gpm. This combines to a peak flow of up to 18.1 mgd or 12,600 gpm. The Gafner WRP would continue to produce 0.75 mgd of reclaimed water. This water would be used by the La Costa Golf Course, exclusively.

The distribution system for Alternative No. 4 is shown on Figure 8.4. This distribution system is similar to that of Alternative No. 3, with the addition of a new distribution network and diurnal storage tank for the Carillo Ranch development.

Of the 4.0 mgd of peak flow from the Meadowlark WRP, 3.0 mgd would be pumped to the El Camino Pump Station and 1.0 mgd would be pumped to the Carillo Ranch area users. The distribution lines for the Carillo Ranch area and the Lake Calavera area would be interconnected to each.

OCEANSIDE

OCEANSIDE

Shadowridge Water
Reclamation Plant
(1.0 MGD)

Shadowridge Effluent
Failsafe Line

VISTA

CALTRANS Line

Pacific

Encina Water
Pollution Control
Facility

Ocean

ENCINITAS

Gafner Water
Reclamation Facility
(0.75 MGD)

SAN MARCOS

Meadowlark Water
Reclamation Facility
(2.0 MGD)

Mahr Reservoir

56 MG
(El. 560)

ENCINITAS

- Legend**
- Sewer Drainage Basin Boundary
 - Failsafe Lines
 - - - Existing Reclaimed Water Lines
 - . - Future Reclaimed Water Lines
 - . . Water Lines Available for Reclaimed Use



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

**ALTERNATIVE NO. 3
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM**

FIGURE 8.3

OCEANSIDE

OCEANSIDE

Shadowridge Water
Reclamation Plant
(1.0 MGD)

Shadowridge Effluent
Failsafe Line

Santa Fe I Tank
2.5 MG
(El. 660)

CALTRANS Line

Pacific

Encina Water
Pollution Control
Facility

Ocean

ENCINITAS

Gafner Water
Reclamation Facility
(0.75 MGD)

SAN MARCOS

New Pumps to El. 660
Meadowlark Water
Reclamation Facility
(4.0 MGD)

Mahr Reservoir

56 MG
(El. 550)

ENCINITAS

Legend

- Sewer Drainage Basin Boundary
- Failsafe Lines
- - - Existing Reclaimed Water Lines
- . - Future Reclaimed Water Lines
- . . Water Lines Available for Reclaimed Use



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

ALTERNATIVE NO. 4
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM

FIGURE 8.4



Flow from the Meadowlark WRP to the Carillo Ranch (660 feet pressure zone) area would require new pumping capacity of 1.5 mgd and about 350 feet of head. Flow from the Santa Fe Tank I to the Carillo Ranch area would be by gravity. A 4.5 mgd pump station capacity with 660 feet of head would be required to pump from Lake Calavera to the 660 feet pressure zone service area. The remaining portions of the distribution system that form this alternative are similar to that of Alternative No. 3. Flow from the Mahr Reservoir to the Lower La Costa service area would be by gravity.

Alternative No. 5

Alternative Nos. 1 and 2 both included expansions of the Meadowlark Water Reclamation Plant. The advantages of expansion at Meadowlark include the available hydraulic grade, the lower TDS in the effluent as compared to the EWPCF, and the use of existing facilities. The disadvantage is the additional pumping at Vallecitos Lift Station No. 1.

Alternative No. 5 does not include any expansion of the Meadowlark plant, but all new capacity would be provided at the new Encina Water Reclamation Plant. For the purposes of this alternative, the entire potential reclaimed water market would be served. The peak month capacity would be 17.25 mgd and a total of 11,020 acre feet per year would be used.

The basis of treatment for the proposed Encina WRP was shown schematically on Figure 8.2. The secondary effluent from the EWPCF would be pumped to an influent equalization reservoir. These facilities would be sized to divert flows with the lowest TDS concentrations. The TDS concentration varies diurnally as discussed in Chapter 5. The TDS concentration is lower when flows to the EWPCF are the highest. By capturing the daily reclaimed water demand over a portion of the day, the resulting TDS would expect to be 100 milligrams per liter lower. This will result in lower demineralization capital and operating costs.

The peak hourly demand for the entire market is 40,600 gpm or 58.5 mgd. This alternative will provide 17.25 mgd of flow from the future Encina WRP, 2.0 mgd from the Meadowlark WRP, and 0.75 mgd from the Gafner WRP (to be used exclusively by the La Costa Golf Course). The remaining peak demand of 38.5 mgd or 26,700 gpm would be provided by diurnal storage tanks throughout the service area and also the effluent storage reservoir from Encina WRP. The storage capacity of the diurnal tanks would be able to supply the following maximum peak flow rates during the eight hour irrigation period:

Tank	Volume	Peak Flow Rate
D-Tanks	2.5 MG	5.0 mgd or 5,200 gpm
C-Tank (Calavera)	1.5 MG	4.5 mgd or 3,100 gpm
Santa Fe I	2.5 MG	7.5 mgd or 5,200 gpm
Effluent Storage EWRP	6.5 MG	19.5 mgd or 13,500 gpm
Total	13.0 M	39 mgd or 27,000 gpm

Some future reclaimed water piping will be aligned along planned future extensions of major roads. The resulting distribution system is shown on Figure 8.5. The diurnal storage tanks need to be filled with flows from the Encina WRP and Meadowlark WRP. The Meadowlark WRP, with a

flow rate of 2.0 mgd would produce 1.67 mg for diurnal storage. The remaining 11.33 mg in diurnal storage would be provided for by the Encina WRP.

Since the HGL of some of the storage tanks are lower than the pressure zones which they will serve, pumping stations will be needed as shown on Figure 8.5. Pumping/booster stations will be required for the following facilities:

Facility	Flow Capacity (mgd)	Total Dynamic Head (feet)
Encina WRP	35.0	400
C-Tank	4.5	200
Upper La Costa	2.9	300
Lower La Costa	8.6	100
Poinsettia Road	3.3	250
North El Camino	2.2	30

In addition, pressure reducing stations would be required throughout the distribution system to maintain proper pressure in the different pressure zones.

Alternative No. 6

Alternative No. 6 is similar to Alternative No. 5 and would also serve the entire market. This alternative would use a combination of seasonal as well as diurnal storage. Reclaimed water would be produced by the Encina WRP (15.00 mgd), Meadowlark WRP (2.0 mgd), and Gafner WRP (0.75 mgd) to be used exclusively by the La Costa Golf Course). Diurnal storage at the D-Tanks, C-Tanks, and the Santa Fe I Tank would provide 6.5 mg of storage and provide a peak flow capacity of 13,500 gpm or 19.4 mgd during the irrigation period. Seasonal storage from Lake Calavera and Mahr Reservoir would provide another 4,800 gpm or 6.9 mgd of peak flow capacity. The remaining flow would be provided by the Encina WRP effluent storage reservoir. This reservoir would be sized for 4.8 mg to provide 10,000 gpm or 14.4 mgd of peak flow.

In this alternative the additional peak flow capacity provided by Lake Calavera and Mahr Reservoir reduces the volume of the effluent storage reservoir at the Encina WRP to be reduced by about 1.7 million gallons.

New pumping capacity would be required at the Encina WRP, Meadowlark WRP, Lake Calavera, and Mahr Reservoir. The estimated additional pumping requirements are as follows:

Facility	Flow Capacity (mgd)	Total Dynamic Head (feet)
Encina WRP	30	400
Mahr Tank	4.5	200
Upper La Costa	2.9	300
Lower La Costa	8.6	100
Poinsettia Road	3.3	250
North El Camino	2.2	300

OCEANSIDE

OCEANSIDE

Shadowridge Water
Reclamation Plant
(1.0 MGD)

Shadowridge Effluent
Failsafe Line

VISTA
Santa Fe I Tank
2.5 MG
(El. 660)

CALTRANS Line

Pacific

Encina Water
Pollution Control
Facility
17.2 MGD

Future Encina
Water Reclamation
Facility
17.2 MGD

Ocean

ENCINITAS

Gafner Water
Reclamation Facility
(0.75 MGD)

SAN MARCOS

Mahr Reservoir
(El. 550)

56 MG
(El. 550)

ENCINITAS

Legend

- Sewer Drainage Basin Boundary
- Failsafe Lines
- - - Existing Reclaimed Water Lines
- . - Future Reclaimed Water Lines
- . . Water Lines Available for Reclaimed Use



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

ALTERNATIVE NO. 5
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM

FIGURE 8.5

Some of the planned reclaimed water lines will also be aligned along planned future major road extensions. Figure 8.6 shows the distribution system and users for this alternative.

Alternative No. 7

This alternative is similar to Alternative No. 6. The difference is that the reclaimed water market areas north of Agua Hedionda Lagoon and Upper La Costa are not served. The peak hourly demand reduces to about 52 mgd or 36,400 gpm.

For this alternative the smaller reclaimed water market requires a smaller reclamation plant. The Encina WRP would be sized to handle 13.5 mgd. The diurnal and seasonal storage tanks have the same capacity and provide the same peak flow as in Alternative No. 6, with exception to the effluent storage basin which would have a storage volume of 3.4 mg and provide a peak flow capacity of 7,100 gpm or 10.2 mgd.

With the exception of the area north of Agua Hedionda Lagoon and the upper La Costa area, the distribution system for this alternative is similar to that for Alternative No. 6. Figure 8.7 shows the distribution system for Alternative No. 7.

Alternative No. 8

The alternative combines the capacity expansion at the Meadowlark Water Reclamation Plant with the construction of the Encina Water Reclamation Plant. It utilizes a combination of facilities from Alternative No. 2 and No. 7. The capacity at Meadowlark WRP would increase from 2.0 to 4.0 mgd, as was the case in Alternative No. 2. The Encina WRP would also be constructed; however, at a reduced capacity of 11.5 mgd.

The reclaimed water facilities for this alternative are sized based on the existing and ultimate reclaimed water market used for Alternative No. 7. The reclaimed water distribution system and diurnal and seasonal storage facilities are also the same as Alternative No. 7 and is shown on Figure 8.7. The peak hourly demands and annual resources are 36,400 gpm and 9,780 acre-feet, respectively. These values are consistent with the demands for Alternative No. 7.

Alternative No. 9

This alternative evaluates a potential first phase project to increase the reclaimed water supply and distribution system to a peak month capacity of 8.0 mgd. This alternative consists of the existing system with the capacity of the Meadowlark Water Reclamation Plant increased from 2.0 mgd to 3.0 mgd and constructing a 4.25 mgd Encina Water Reclamation Plant. An annual resource of 4,480 acre-ft of reclaimed water would be produced.

Alternative No. 10

This alternative is similar to Alternative No. 4. It consists of the existing facilities with the Meadowlark WRP expanded to 4.0 mgd and upgrades the Mahr Reservoir for seasonal storage. The Mahr Reservoir would provide 165 acre-feet of seasonal storage. With the expanded capacity of the Meadowlark WRP this alternative would be able to provide a peak hour flow of 5.65 mgd or

3,540 gpm. Annual reclaimed water resource available for this alternative is 2,860 acre-feet. The market area would consist of existing users and new users along Rancho Santa Fe Road in the La Costa area.

The existing distribution system shown on Figure 3.1 would be used. Additional pump/booster stations would be provided and are included in the cost analysis.

8.14 Alternative Analysis

This section compares the alternatives with respect to economic factors. Capital, operations and maintenance (O&M) costs, and reclaimed water purchases are estimated. In addition, sources of revenue including reclaimed water sales and Metropolitan Water District (MWD) rebates are taken into account.

Basis of Costs

The basis of costs are construction cost records from facilities designed by Carollo Engineers. Preliminary facility sizes have been determined based on the market demands and resulting pipe, reservoir, and pump station capacities. The pipe sizes have been determined using a network analysis program. Other factors were described in the previous section "Alternative Development Criteria." The actual construction costs could be higher or lower based on the final facilities designed and the construction cost climate.

Cost Comparison

Costs for the ten alternatives are compared on Table 8.4. For each alternative, the capital, O&M, water purchase, State loan repayment, and revenue are shown.

The unit reclaimed water cost varies from a low of \$632 per acre-foot to a high of \$1,010 per acre-foot. The lowest cost is for Alternative No. 1. This consists of a very minor improvement to the Meadowlark Water Reclamation Plant and maximum use of existing facilities. The projected cost of \$632 per acre-foot compares well with the accounted cost of reclaimed water in Fiscal Year 1993/1994 at \$676 per acre-foot. Neither of these costs reflect rebates. Considering sales and the rebate, this alternative would result in net revenues to the District.

Alternative No. 2 would increase the capacity of Meadowlark to 4.0 mgd. The resulting unit cost of water increases, but because of the MWD rebate, the projected revenue to the District would increase.

Alternative No. 3 would use seasonal storage in the Lake Calavera and Mahr Reservoirs to provide peak month, effective capacity. The treatment capacity at the Meadowlark Water Reclamation Plant would be 3 mgd as for Alternative No. 1. However, the reclaimed water that could be delivered would increase from 3.75 mgd to 5.9 mgd. This results in a total annual delivery increase from 2,000 acre-feet to 3,160 acre-feet. Because of pipeline and reservoir improvement cost, the resulting water cost is higher than Alternative No. 2 with a resulting decrease in District revenues. However, the MWD rebate would increase the revenue.

Alternative No. 4 would also utilize seasonal storage with increased Meadowlark capacity to a total of 4 mgd. This results in higher unit costs and lower revenues as compared to Alternative No. 2, with no storage.

Alternatives Nos. 5 and 6 both include the construction of an Encina WRP. Alternative No. 5 and No. 6, with the MWD rebate, both show a net loss to the District.

Alternative No. 7 is with a smaller customer base. Capital and O&M costs for the Encina WRP and distribution pipelines are reduced. This alternative results in a nominal net revenue to the District.

Alternative No. 8 combines the capacity expansion at the Meadowlark WRP with the Encina WRP. The cost savings in reduced capacity Encina WRP, relative to the other alternatives, is offset by the capital cost for the expansion of Meadowlark WRP. Moreover, there would be additional water purchase cost, compared to Alternative No. 7, for purchasing additional water from the upsized Meadowlark WRP. The costs and income for this alternative results in loss of revenue to the District.

Alternative No. 9, with an Encina WRP at 4.25 mgd capacity is the only alternative with a new water reclamation plant that results in gain of revenue.

OCEANSIDE

OCEANSIDE

Shadowridge Water Reclamation Plant (1.0 MGD)

Shadowridge Effluent Failsafe Line

Santa Fe I Tank 2.5 MG (El. 660)

SAN MARCOS

Mahr Reservoir (El. 550)

ENCINITAS

ENCINITAS

Gafner Water Reclamation Facility (0.75 MGD)

CALTRANS Line

Pacific

Encina Water Pollution Control Facility 17.2 MGD

Future Encina Water Reclamation Facility 13.5 MGD

Ocean

- Legend**
- Sewer Drainage Basin Boundary
 - Failsafe Lines
 - - - Existing Reclaimed Water Lines
 - . - . Future Reclaimed Water Lines
 - . . . Water Lines Available for Reclaimed Use



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

**ALTERNATIVE NO. 6
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM**

FIGURE 8.6



OCEANSIDE

OCEANSIDE

Shadowridge Water
Reclamation Plant
(1.0 MGD)

Shadowridge Effluent
Failsafe Line

Santa Fe I Tank
2.5 MG
(El. 660)

CALTRANS Line

Pacific

Encina Water
Pollution Control
Facility
17.2 MGD

Future Encina
Water Reclamation
Facility
13.5 MGD

Ocean

ENCINITAS

Gafner Water
Reclamation Facility
(0.75 MGD)

SAN MARCOS

Meadowlark Water
Reclamation Facility
(2.0 MGD)

Mahr Reservoir
56 MG
(El. 550)

ENCINITAS

Legend

- Sewer Drainage Basin Boundary
- Failsafe Lines
- - - Existing Reclaimed Water Lines
- . - Future Reclaimed Water Lines
- . . Water Lines Available for Reclaimed Use



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

ALTERNATIVE NO. 7
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM

FIGURE 8.7

Table 8.4 Reclaimed Water Cost Analysis Model - with Demineralization and Maximum MWD Rebate Carlsbad Municipal Water District Reclaimed Water Master Plan										
Alternative	1	2	3	4	5	6	7	8	9	10
Maximum month demand - MGD	3.75	4.75	5.90	7.05	20.00	20.00	18.50	18.50	8.00	5.65
Annual Reclaimed Water Usage - AF	2,000	2,520	3,160	3,780	11,020	11,020	9,780	9,780	4,480	2,860
Capital Costs										
Pipelines	\$0	\$0	\$4,051,000	\$6,095,000	\$24,500,000	\$24,287,000	\$18,280,000	18,280,000	\$2,038,000	\$880,000
Reservoirs	\$0	\$0	\$1,492,000	\$1,742,000	\$3,650,000	\$4,292,000	\$3,592,000	\$3,592,000	\$0	\$992,000
Booster Stations	\$90,000	\$170,000	\$699,000	\$836,000	\$1,190,000	\$1,658,000	\$1,518,000	\$1,518,000	\$301,000	\$170,000
Treatment (incl. RO)	\$1,312,000	\$3,194,000	\$1,312,000	\$3,194,000	\$33,099,000	\$28,844,000	\$27,310,000	\$27,916,000	\$15,282,000	\$3,194,000
Subtotal	\$1,402,000	\$3,364,000	\$7,554,000	\$11,867,000	\$62,439,000	\$59,081,000	\$50,700,000	\$51,306,000	\$17,621,000	\$5,236,000
Project Cost @ 37.5%	\$526,000	\$1,262,000	\$2,833,000	\$4,450,000	\$23,415,000	\$22,156,000	\$19,013,000	\$19,240,000	\$6,608,000	\$1,964,000
Total Capital Cost	\$1,928,000	\$4,626,000	\$10,387,000	\$16,317,000	\$85,854,000	\$81,237,000	\$69,713,000	\$70,546,000	\$24,229,000	\$7,200,000
Annual Capital Cost	\$152,000	\$366,000	\$759,000	\$1,202,000	\$6,470,000	\$6,101,000	\$5,265,000	\$5,331,000	\$1,892,000	\$548,000
O&M										
O&M	\$175,000	\$179,000	\$233,000	\$251,000	\$2,413,000	\$2,373,000	\$2,014,000	\$1,951,000	\$735,000	\$188,000
Power	\$69,000	\$103,000	\$133,000	\$176,000	\$1,121,000	\$1,010,000	\$870,000	\$850,000	\$314,000	\$130,000
Chemicals	\$0	\$0	\$0	\$0	\$200,000	\$180,000	\$160,000	\$150,000	\$100,000	\$0
Administration	\$0	\$0	\$0	\$0	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$0
Annual O&M Cost	\$244,000	\$282,000	\$366,000	\$427,000	\$3,934,000	\$3,763,000	\$3,244,000	\$3,151,000	\$1,349,000	\$318,000
Water Purchase - AF										
Vallecitos (\$262/AF)	1,610	2,130	2,516	3,136	1,070	1,235	1,235	2,130	1,610	2,305
Leucadia (\$733/AF)	390	390	390	390	390	390	390	390	390	390
Lake Calavera (filling - \$262/AF)	0	0	254	254	0	254	254	254	0	165
Annual Water Purchase Cost	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$566,000	\$676,000	\$676,000	\$910,000	\$708,000	\$933,000
SRF Loan Repayment	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
Annual Total Cost	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$11,130,000	\$10,700,000	\$9,345,000	\$9,552,000	\$4,109,000	\$1,959,000
Unit Reclaimed Water Cost - \$/AF	\$632	\$656	\$727	\$784	\$1,010	\$971	\$956	\$977	\$917	\$685
Revenue										
Reclaimed Water sales @ 704/AF	\$1,408,000	\$1,774,000	\$2,225,000	\$2,661,000	\$7,758,000	\$7,758,000	\$6,885,000	\$6,885,000	\$3,154,000	\$2,013,000
MWD Rebate @ \$0 to \$250/AF max.	\$414,000	\$581,00	\$790,000	\$945,000	\$2,755,000	\$2,755,000	\$2,445,000	\$2,445,000	\$1,120,000	\$715,000
Annual Revenue	\$1,822,000	\$2,355,000	\$3,015,000	\$3,606,000	\$10,513,400	\$10,513,000	\$9,330,000	\$9,330,000	\$4,274,000	\$2,728,000
Balance	\$558,000	\$703,000	\$718,000	\$643,000	(\$617,000)	(\$187,000)	(\$15,000)	(\$222,000)	\$165,000	\$769,000

Alternative No. 10 results in the highest annual revenue for the District. It builds upon the existing system to deliver additional reclaimed water to users in southern Carlsbad. However, this alternative does not have the new Encina WRP.

Purchase of Raw Imported Water

The above Alternatives 5 through 9 included the construction of demineralization at the Encina WRP to reduce the TDS to 1,000 mg/L. Table 8.5 compares the same alternatives without demineralization. Raw imported water would be purchased and blended to meet the quality objective of 1,000 mg/L. The analysis assumes imported water with a TDS of 600 mg/L. Alternatives 5A, 6A, 7A, 8A, and 9A are compared to Alternatives 5, 6, 7, 8, and 9, respectively. These Alternatives 5A - 9A do not include demineralization.

Table 8.5 Comparison of Demineralization and Imported Raw Water Alternatives Carlsbad Municipal Water District Reclaimed Water Master Plan			
Alternative No.	Encina WRP Capacity (mgd)	Capacity (mgd) Demineralization	Capacity (mgd) Imported Water
5	17.3	4.0	0
5A	11.5	0	5.8
6	15.0	3.5	0
6A	10.0	0	5
7	13.5	3.0	0
7A	9.0	0	4.5
8	11.5	2.5	0
8A	7.7	0	3.8
9	4.25	1.0	0
9A	2.8	0	1.5

By using raw imported water to meet the water quality objective, not only would the RO process be eliminated, but the capacity of the Encina WRP would be down sized for each alternative. This results in a lower capital and O&M cost. Alternatives 5A, 6A, 7A, 8A, and 9A would all require additional capital cost for pipeline and distribution turnout. The savings in eliminating the demineralization process and reducing the Encina WRP capacity more than offsets this cost. However, the purchase of raw imported water increased the cost of these alternatives. Alternatives 5A, 6A, 7A, 8A, and 9A all result in loss of revenue.

Tables 8.4 and 8.6 present the summary of the cost analysis for each of the alternatives. The costs in Table 8.6 reflect the imported raw water alternatives.

Comparison of Alternatives

As summarized in Tables 8.4 and 8.6, there is a wide range of costs and potential usage for the alternatives. This results in varying levels of net revenue or cost to the District.

Table 8.6 Reclaimed Water Cost Analysis Model - without Demineralization and Maximum MWD Rebate
 Carlsbad Municipal Water District Reclaimed Water Master Plan

Alternative	1	2	3	4	5A	6A	7A	8A	9A
Maximum month demand - MGD	3.75	4.75	5.90	7.05	20.00	20.00	18.50	18.50	8.00
Annual Reclaimed Water Usage - AF	2,000	2,520	3,160	3,780	11,020	11,020	9,780	9,780	4,480
Capital Costs									
Pipelines	\$0	\$0	\$4,051,000	\$6,095,000	\$25,033,000	\$24,820,000	\$18,812,000	\$18,812,000	\$2,268,000
Reservoirs	\$0	\$0	\$1,492,000	\$1,742,000	\$4,800,000	\$3,642,000	\$4,742,000	\$4,742,000	\$0
Booster Stations	\$90,000	\$170,000	\$699,000	\$836,000	\$1,190,000	\$1,658,000	\$1,518,000	\$1,518,000	\$301,000
Treatment (no RO)	\$1,312,000	\$3,194,000	\$1,312,000	\$3,194,000	\$17,552,000	\$15,289,000	\$15,773,000	\$16,869,000	\$12,032,000
Subtotal	\$1,402,000	\$3,364,000	\$7,554,000	\$11,867,000	\$48,575,000	\$45,409,000	\$40,845,000	\$41,941,000	\$14,601,000
Project Cost @ 37.5%	\$526,000	\$1,262,000	\$2,833,000	\$4,450,000	\$18,216,000	\$17,028,000	\$15,317,000	\$15,728,000	\$5,475,000
Total Capital Cost	\$1,928,000	\$4,626,000	\$10,387,000	\$16,317,000	\$66,791,000	\$62,437,000	\$56,162,000	\$57,669,000	\$20,076,000
Annual Capital Cost	\$152,000	\$366,000	\$759,000	\$1,202,000	\$4,945,000	\$4,616,000	\$4,175,000	\$4,294,000	\$1,561,000
O&M									
O&M	\$175,000	\$179,000	\$233,000	\$251,000	\$1,740,000	\$1,692,000	\$1,498,000	\$1,322,000	\$588,000
Power	\$69,000	\$103,000	\$133,000	\$176,000	\$1,016,000	\$913,000	\$770,000	\$700,000	\$250,000
Chemicals	\$0	\$0	\$0	\$0	\$140,000	\$130,000	\$120,000	\$100,000	\$100,000
Administration	\$0	\$0	\$0	\$0	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
Annual O&M Cost	\$244,000	\$282,000	\$366,000	\$427,000	\$3,096,000	\$2,935,000	\$2,588,000	\$2,322,000	\$1,138,000
Water Purchase - AF									
Vallecitos (\$262/AF)	1,610	2,130	2,516	3,136	1,070	1,235	1,235	2,130	1,610
Leucadia (\$733/AF)	390	390	390	390	390	390	390	390	390
Lake Calavera (filling - \$262/AF)	0	0	254	254	0	254	254	254	0
MWWD - Raw dilution water (\$449/AF)	0	0	0	0	1,067	1,033	867	800	276
CWA - Potable dilution water (\$531/AF)	0	0	0	0	2,133	2,067	1,733	1,600	551
Annual Water Purchase Cost									
Including MWD dilution water	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$2,178,000	\$2,237,000	\$1,986,000	\$2,119,000	\$1,124,000
Excluding MWD dilution water	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$566,000	\$676,000	\$676,000	\$910,000	\$708,000
SRF Loan Requirement	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
Annual Total Cost									
Including MWD dilution water	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$10,379,000	\$9,948,000	\$8,909,000	\$8,895,000	\$3,983,000
Excluding MWD dilution water	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$8,767,000	\$8,387,000	\$7,599,000	\$7,686,000	\$3,567,000
Unit Reclaimed Water Cost - \$/AF									
Including MWD dilution water	\$632	\$656	\$727	\$784	\$942	\$903	\$911	\$910	\$889
Excluding MWD dilution water	\$632	\$656	\$727	\$784	\$796	\$761	\$777	\$786	\$796
Revenue									
Reclaimed Water Sales @ \$704/AF	\$1,408,000	\$1,774,000	\$2,225,000	\$2,661,000	\$7,758,000	\$7,758,000	\$6,885,000	\$6,885,000	\$3,154,000
MWD Rebate @ \$0 to \$250/AF max.	\$414,000	\$581,000	\$790,000	\$945,000	\$1,955,000	\$1,980,000	\$1,795,000	\$1,845,000	\$1,120,000
Annual Revenue	\$1,822,000	\$2,355,000	\$3,015,000	\$3,606,000	\$9,713,000	\$9,738,000	\$8,680,000	\$8,730,000	\$4,274,000
Balance	\$588,000	\$703,000	\$718,000	\$643,000	(\$666,000)	(\$210,000)	(\$229,000)	(\$165,000)	\$291,000

- 1) The alternatives using the existing infrastructure at the Meadowlark Water Reclamation Plant, the Gafner Water Reclamation Plant, and the Lake Calavera and Mahr Reservoirs would result in the greatest net revenue to the District. However, the District may choose to implement one of Alternative Nos. 5 through 9 as part of an overall, water resources strategy.
- 2) In comparing Alternatives Nos. 6 and 7, it would not be cost-efficient to implement reclaimed water in the older, northern area of the City. This is due to the high cost of distribution lines in this developed area.
- 3) Blending large amounts of imported water to reduce the TDS of the total reclaimed water supply appears to be cost-effective. However, the net revenue to the District would decrease because of lower MWD rebates. Further, the effluent TDS from the EWPCF may decrease in the future as discussed in Chapter 5. A significant TDS contribution comes from seven industrial dischargers. These dischargers have entered into Enforcement Compliance Schedule Agreements. These require a reduction in TDS discharge to 1,500 mg/L by May, 1997. This deadline can be extended by two years to coincide with implementation of a water reclamation plant at Encina. This action would decrease the EWPCF effluent to a level close to 1,000 mg/L.
- 4) The MWD is preparing a salinity management study. The purpose is to manage the salt load to all its customers. If implemented, the mineral quality might improve to a level that would reduce home water softener use and therefore reduce wastewater TDS to acceptable levels. This study is scheduled for completion in 1997.
- 5) The MWD rebate of up to \$250 acre-feet is an important part of the District's revenue stream in comparing the alternatives. Tables 8.7 and 8.8 show the net District revenue with no further rebate other than the existing Phase I program for 1,500 acre-feet. Under this scenario, only the alternatives with expanding the existing facilities would result in net revenue to the District. However, it is expected that the MWD will continue the rebate program under their Local Resources Plan.
- 6) Grant monies may be available from the Bureau of Reclamation. These monies would reduce local project costs and the amount of the MWD rebate. Therefore, the grants have a positive benefit to the entire region. They can reduce financing costs, but would not reduce the net cost of the reclaimed water.
- 7) The use of the seasonal storage reservoirs appears to be cost effective for the ultimate program. However, their use may not be cost-effective for the smaller programs. This can be seen by comparing Alternatives Nos. 1 and 2 to 3 and 4. The annual balance decreases when seasonal storage is used.
- 8) Alternative No. 9 is the most cost effective alternative that incorporates a new Encina Water Reclamation Plant. This alternative may be a potential first phase project to expand the reclaimed water supply and distribution system. Future phases may expand the system to the capacity described in Alternative No. 7.

Table 8.7 Reclaimed Water Cost Analysis Model - with Demineralization and Limited MWD Rebate
 Carlsbad Municipal Water District Reclaimed Water Master Plan

Alternative	1	2	3	4	5	6	7	8	9	10
Maximum month demand - MGD	3.75	4.75	5.90	7.05	20.00	20.00	18.50	18.50	8.00	5.65
Annual Reclaimed Water Usage - AF	2,000	2,520	3,160	3,780	11,020	11,020	9,780	9,780	4,480	2,860
Capital Costs										
Pipelines	\$0	\$0	\$4,051,000	\$6,095,000	\$24,500,000	\$24,287,400	\$18,280,000	\$18,280,000	\$2,268,000	\$880,000
Reservoirs	\$0	\$0	\$1,492,000	\$1,742,000	\$3,650,000	\$4,292,000	\$3,592,000	\$3,592,000	\$0	\$992,000
Booster Stations	\$90,000	\$170,000	\$699,000	\$836,000	\$1,190,000	\$1,658,000	\$1,518,000	\$1,518,000	\$301,000	\$170,000
Treatment (incl. RO)	\$1,312,000	\$3,194,000	\$1,312,000	\$3,194,000	\$33,099,000	\$28,844,000	\$27,310,000	\$27,916,000	\$15,282,000	\$3,194,000
Subtotal	\$1,402,000	\$3,364,000	\$7,554,000	\$11,867,000	\$62,439,000	\$59,081,400	\$50,700,000	\$51,306,000	\$17,621,000	\$5,236,000
Project Cost @ 37.5%	\$526,000	\$1,262,000	\$2,833,000	\$4,450,000	\$23,415,000	\$22,156,000	\$9,013,000	\$19,240,000	\$6,608,000	\$1,964,000
Total Capital Cost	\$1,928,000	\$4,626,000	\$10,387,000	\$16,317,000	\$85,854,000	\$81,237,400	\$69,713,000	\$70,546,000	\$24,229,000	\$7,200,000
Annual Capital Cost	\$152,000	\$366,000	\$759,000	\$1,202,000	\$6,470,000	\$6,101,000	\$5,265,000	\$5,331,000	\$1,892,000	\$548,000
O&M										
O&M	\$175,000	\$179,000	\$233,000	\$251,000	\$2,413,000	\$2,373,000	\$2,014,000	\$1,951,000	\$735,000	\$188,000
Power	\$69,000	\$103,000	\$133,000	\$176,000	\$1,121,000	\$1,010,000	\$870,000	\$850,000	\$314,000	\$130,000
Chemicals	\$0	\$0	\$0	\$0	\$200,000	\$180,000	\$160,000	\$150,000	\$100,000	\$0
Administration	\$0	\$0	\$0	\$0	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$0
Annual O&M Cost	\$244,000	\$282,000	\$366,000	\$427,000	\$3,934,000	\$3,763,000	\$3,244,000	\$3,151,000	\$1,349,000	\$318,000
Water Purchase - AF										
Vallecitos (\$262/AF)	1,610	2,130	2,516	3,136	1,070	1,235	1,235	1,230	1,610	2,305
Leucadia (\$733/AF)	390	390	390	390	390	390	390	390	390	390
Lake Calavera (filling - \$262/AF)	0	0	254	254	0	254	254	254	0	165
Annual Water Purchase Cost	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$566,000	\$676,000	\$676,000	\$910,000	\$708,000	\$933,000
SRF Loan Repayment	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
Annual Total Cost	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$11,130,000	\$10,700,000	\$9,345,000	\$9,552,000		
Unit Reclaimed Water Cost - \$/AF	\$632	\$656	\$727	\$784	\$1,010	\$971	\$956	\$977	\$4,109,000	\$1,959,000
Revenue									\$4,109,000	\$1,959,000

Table 8.7 Reclaimed Water Cost Analysis Model - with Demineralization and Limited MWD Rebate
 Carlsbad Municipal Water District Reclaimed Water Master Plan

Alternative	1	2	3	4	5	6	7	8	9	10
Reclaimed Water sales @ 704/AF	\$1,408,000	\$1,774,000	\$2,225,000	\$2,661,000	\$7,758,000	\$7,758,000	\$6,885,000	\$6,885,000	\$917	\$685
MWD Rebate @ \$0 to \$250/AF (1500 AF Max.)	\$311,000	\$346,00	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000		
Annual Revenue	\$1,719,000	\$2,120,000	\$2,600,000	\$3,036,000	\$8,133,000	\$8,133,000	\$7,260,000	\$7,260,000	\$3,154,000	\$2,013,000
Balance	\$455,000	\$468,000	\$303,000	\$73,000	(\$2,997,000)	(\$2,567,000)	(\$2,085,000)	(\$2,292,000)	\$375,000	\$375,000

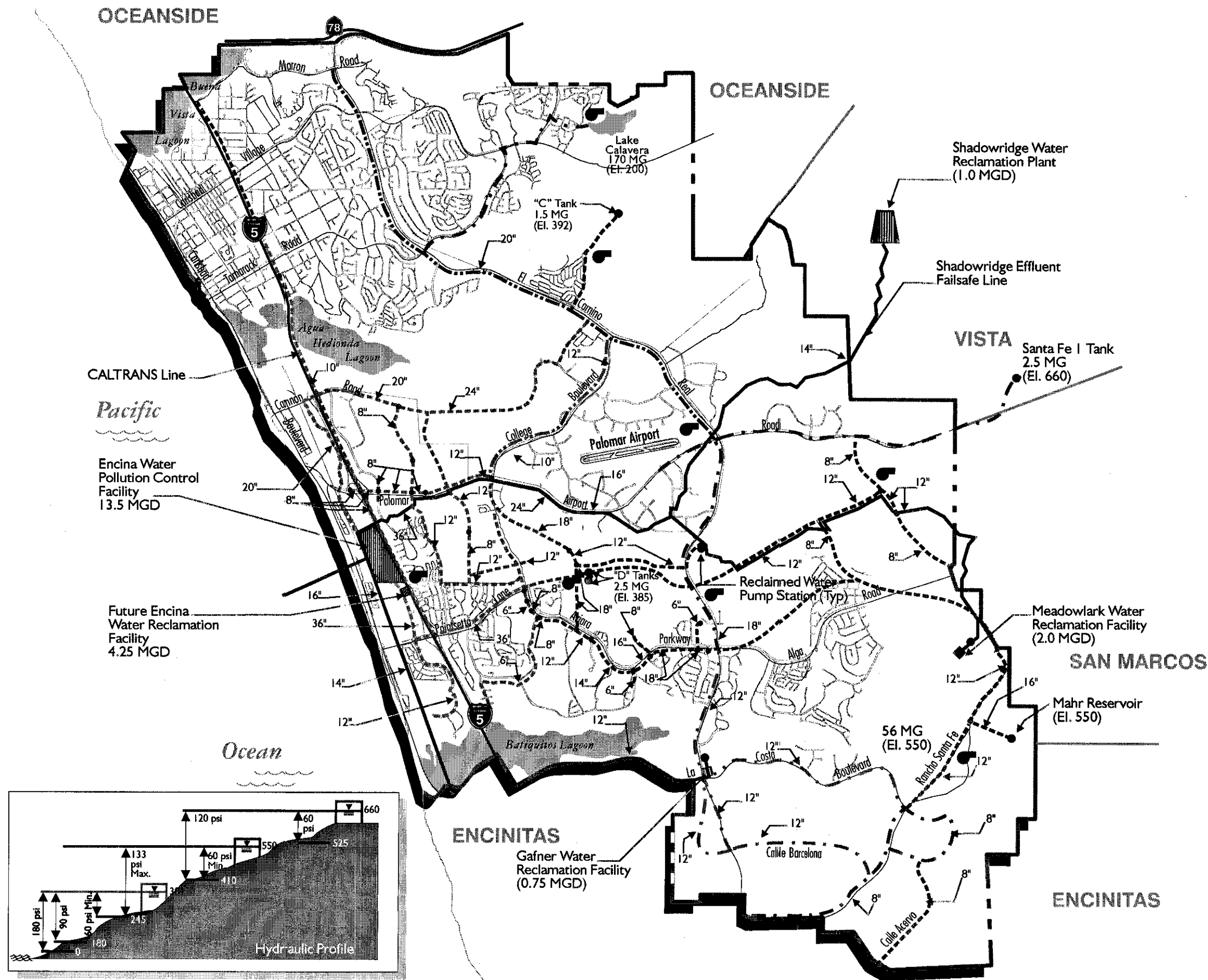
Table 8.8 Reclaimed Water Cost Analysis Model - without Demineralization and Limited MWD Rebate
 Carlsbad Municipal Water District Reclaimed Water Master Plan

Alternative	1	2	3	4	5A	6A	7A	8A	9A
Maximum month demand - MGD	3.75	4.75	5.90	7.05	20.00	20.00	18.50	18.50	8.00
Annual Reclaimed Water Usage - AF	2,000	2,520	3,160	3,780	11,020	11,020	9,780	9,780	4,480
Capital Costs									
Pipelines	\$0	\$0	\$4,051,000	\$6,095,000	\$25,033,000	\$24,820,000	\$18,812,000	\$18,812,000	\$2,268,000
Reservoirs	\$0	\$0	\$1,492,000	\$1,742,000	\$4,800,000	\$3,642,000	\$4,742,000	\$4,742,000	\$0
Booster Stations	\$90,000	\$170,000	\$699,000	\$836,000	\$1,190,000	\$1,658,000	\$1,518,000	\$1,518,000	\$301,000
Treatment (incl. RO)	\$1,312,000	\$3,194,000	\$1,312,000	\$3,194,000	\$17,552,000	\$15,289,000	\$15,773,000	\$16,869,000	\$12,032,000
Subtotal	\$1,402,000	\$3,364,000	\$7,554,000	\$11,867,000	\$48,575,000	\$45,409,000	\$40,845,000	\$41,941,000	\$14,601,000
Project Cost @ 37.5%	\$526,000	\$1,262,000	\$2,833,000	\$4,450,000	\$18,216,000	\$17,028,000	\$15,317,000	\$15,728,000	\$5,475,000
Total Capital Cost	\$1,928,000	\$4,626,000	\$10,387,000	\$16,317,000	\$66,791,000	\$62,437,000	\$56,162,000	\$57,669,000	\$20,076,000
Annual Capital Cost	\$152,000	\$366,000	\$759,000	\$1,202,000	\$4,945,000	\$4,616,000	\$4,175,000	\$4,294,000	\$1,561,000
O&M									
O&M	\$175,000	\$179,000	\$233,000	\$251,000	\$1,740,000	\$1,692,000	\$1,498,000	\$1,322,000	\$588,000
Power	\$69,000	\$103,000	\$133,000	\$176,000	\$1,016,000	\$913,000	\$770,000	\$700,000	\$250,000
Chemicals	\$0	\$0	\$0	\$0	\$140,000	\$130,000	\$120,000	\$100,000	\$100,000
Administration	\$0	\$0	\$0	\$0	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
Annual O&M Cost	\$244,000	\$282,000	\$366,000	\$427,000	\$3,096,000	\$2,935,000	\$2,588,000	\$2,322,000	\$1,138,000
Water Purchase - AF									
Vallecitos (\$262/AF)	1,610	2,130	2,516	3,136	1,070	1,235	1,235	2,130	1,610
Leucadia (\$733/AF)	390	390	390	390	390	390	390	390	390
Lake Calavera (filling - \$262/AF)	0	0	254	254	0	254	254	254	0
MWD - Raw dilution water (\$449/AF)	0	0	0	0	1,067	1,033	867	800	276
CWA - Potable dilution water (\$531/AF)	0	0	0	0	2,133	2,067	1,733	1,600	551
Annual Water Purchase Cost									
Including MWD dilution water	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$2,178,000	\$2,237,000	\$1,986,000	\$2,119,000	\$1,124,000
Excluding MWD dilution water	\$708,000	\$844,000	\$1,012,000	\$1,174,000	\$566,000	\$676,000	\$676,000	\$910,000	\$708,000
SRF Loan Repayment	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000	\$160,000
Annual Total Cost									
Including MWD dilution water	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$10,379,000	\$9,948,000	\$8,909,000	\$8,895,000	\$3,983,000
Excluding MWD dilution water	\$1,264,000	\$1,652,000	\$2,297,000	\$2,963,000	\$8,767,000	\$8,387,000	\$7,599,000	\$7,686,000	\$3,567,000
Unit Reclaimed Water Cost - \$/AF									
Including MWD dilution water	\$632	\$656	\$727	\$784	\$942	\$903	\$911	\$910	\$889
Excluding MWD dilution water	\$632	\$656	\$727	\$784	\$796	\$761	\$777	\$786	\$796
Revenue									
Reclaimed Water sales @ 704/AF	\$1,408,000	\$1,774,000	\$2,225,000	\$2,661,000	\$7,758,000	\$7,758,000	\$6,885,000	\$6,885,000	\$3,154,000
MWD Rebate @ \$0 to \$250/AF (1500 AF Max.)	\$311,000	\$346,000	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000
Annual Revenue	\$1,719,000	\$2,120,000	\$2,600,000	\$3,036,000	\$8,133,000	\$8,133,000	\$7,260,000	\$7,260,000	\$3,529,000
Balance	\$455,000	\$468,000	\$303,000	\$73,000	(\$2,246,000)	(\$1,815,000)	(\$1,649,000)	(\$1,635,000)	(\$454,000)

Recommended Alternative

Alternative No. 7 is recommended as an ultimate reclaimed water system. The facilities in Alternative No. 7 would provide a reclaimed water resource of 9,780 acre-feet per year. The treatment and storage facilities would be able to meet a peak demand of 18.5 mgd. Alternative No. 7 can be implemented in multiple phases, beginning with the expansion of existing treatment facilities and extension of the distribution system. The facilities described in Alternative No. 9 may be an intermediate phase prior to full expansion to the ultimate system in Alternative No. 7.

As shown in Tables 8.4, 8.6, and 8.7 Alternative 9 results in positive cash flow for the District. Expanding the reclaimed water production, storage, and distribution system to Alternative No. 9 as a first phase expansion would generate revenue that could be used to finance the final phase expansion to Alternative No. 7. Figure 8.8 shows the first phases (Alternative No. 9) of the recommended reclaimed water facilities and distribution system. This figure indicates the zones for the distribution system.



Legend

- Sewer Drainage Basin Boundary
- Failsafe Lines
- - - Existing Reclaimed Water Lines
- . - . Future Reclaimed Water Lines
- . . . Water Lines Available for Reclaimed Use

Elevations

- 660
- 550
- 384



WATER, SEWER, RECLAIMED WATER
MASTER PLANS AND
WATER RESOURCES DEVELOPMENT PLAN

**RECOMMENDED
RECLAIMED WATER FACILITIES
AND DISTRIBUTION SYSTEM
(ALTERNATIVE NO. 9)**

FIGURE 8.8

Appendix A

Proposed Wastewater Reclamation Criteria State of California Department of Health Services

Memorandum

Date: January 18, 1996

To: File

From: Division of Drinking Water
and Environmental Management

Subject: Proposed Wastewater Reclamation Criteria (R-13-95)

This is the most current version and was submitted to Office of Regulations on April 25, 1995 for review and scheduling for hearing.

CHAPTER 3

WATER RECLAMATION CRITERIA

ARTICLE 1

DEFINITIONS

60301: - Definitions -

-----{a}--Reclaimed-Water.--Reclaimed-water-means-water-which,-as-a-result-of-treatment-of-domestic-wastewater,-is-suitable-for-a-direct-beneficial-use-or-a-controlled-use-that-would-not-otherwise-occur.

-----{b}--Reclamation-Plant.--Reclamation-plant-means-an-arrangement-of-devices,-structures,-equipment,-processes-and-controls-which-produce-a-reclaimed-water-suitable-for-the-intended-reuse.

-----{c}--Regulatory-Agency.--Regulatory-agency-means-the-California-Regional-Water-Quality-Control-Board-in-whose-jurisdiction-the-reclamation-plant-is-located.

-----{d}--Direct-Beneficial-Use.--Direct-beneficial-use-means-the-use-of-reclaimed-water-which-has-been-transported-from-the-point-of-production-to-the-point-of-use-without-an-intervening-discharge-to-waters-of-the-state.

-----{e}--Food-Crops.--Food-crops-mean-any-crops-intended-for-human-consumption.

-----{f}--Spray-Irrigation.--Spray-irrigation-means-application-of-reclaimed-water-to-crops-by-spraying-it-from-orifices-in-piping.

-----{g}-----Surface--Irrigation.-----Surface--irrigation--means-application-of-reclaimed-water-by-means-other-than-spraying-such-that-contact-between-the-edible-portion-of-any-feed-crop-and-reclaimed-water-is-prevented.

-----{h}--Restricted-Recreational-Impoundment.--Restricted-recreational-impoundment-is-a-body-of-reclaimed-water-in-which-recreation-is-limited-to-fishing,-boating,-and-other-non-body-contact-water-recreation-activities.

-----{i}--Nonrestricted-Recreational-Impoundment.--A-nonrestricted-recreational-impoundment-is-an-impoundment-of-reclaimed-water-in-which-no-limitations-are-imposed-on-body-contact-water-sport-activities.

-----{j}--Landscape-Impoundment.--A-landscape-impoundment-is-a-body-of-reclaimed-water-which-is-used-for-aesthetic-enjoyment-or-which-otherwise-serves-a-function-not-intended-to-include-public-contact.

-----{u}--Standby-Unit-Process--A-standby-unit-process-is-an alternate-unit-process-or-an-equivalent-alternative-process-which is-maintained-in-operable-condition-and-which-is-capable-of providing-comparable-treatment-for-the-entire-design-flow-of-the unit-for-which-it-is-a-substitute.

-----{v}-Power-Source--Power-source-means-a-source-of-supplying energy-to-operate-unit-processes.

-----{w}-Standby-Power-Source---Standby-power-source-means-an automatically-actuated-self-starting-alternate-energy-source maintained-in-immediately-operable-condition-and-of-sufficient capacity-to-provide-necessary-service-during-failure-of-the normal-power-supply.

-----{x}-Standby-Replacement-Equipment----Standby-replacement equipment-means-reserve-parts-and-equipment-to-replace-broken-down-or-worn-out-units-which-can-be-placed-in-operation-within-a 24-hour-period.

{y}-Standby-Chlorinator---A-standby-chlorinator-means-a duplicate-chlorinator-for-reclamation-plants-having-one chlorinator-and-a-duplicate-of-the-largest-unit-for-plants-having multiple-chlorinator-units.

{z}---Multiple---Point---Chlorination-----Multiple---point chlorination-means-that-chlorine-will-be-applied-simultaneously at-the-reclamation-plant-and-at-subsequent-chlorination-stations located-at-the-use-area-and/or-some-intermediate-point--It-does not-include-chlorine-application-for-odor-control-purposes.

{aa}-Alarm---Alarm-means-an-instrument-or-device-which continuously-monitors-a-specific-function-or-a-treatment-process and-automatically-gives-warning-of-an-unsafe-or-undesirable condition-by-means-of-visual-and-audible-signals.

{bb}-Person--Person-also-includes-any-private-entity,-city, county,-district,-the-State-or-any-department-or-agency-thereof.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.160. Coagulated Wastewater

"Coagulated wastewater" means oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated upstream from a filter by the addition of suitable floc-forming chemicals.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.200. Direct Beneficial Use

"Direct beneficial use" means the use of reclaimed water that has been transported from the point of treatment or production to the point of use without an intervening discharge to waters of the State.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.225. Disinfected Secondary-23 Reclaimed Water

"Disinfected secondary-23 reclaimed water" means reclaimed water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed an MPN of 23 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.240. Drift

"Drift" means the amount of water that escapes to the atmosphere as water droplets from a cooling system.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.250. Dual Plumbed System

"Dual Plumbed" or "Dual plumbed system" means a system that utilizes separate piping systems for reclaimed water and potable water within a facility and where the reclaimed water is used for either of the following purposes:

- (a) To serve multiple plumbing outlets used by the public within a building
- (b) Landscape irrigation at individual residences

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.310. Facility

"Facility" means any type of building or structure, or a defined area of specific public use that receives water for domestic use from a public water system as defined in Section 4010.10 of the Health and Safety Code and utilizes or proposes to utilize a dual plumbed system.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.330. Food Crops

"Food crops" means any crops intended for human consumption.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.550. Landscape Impoundment

"Landscape impoundment" means an impoundment of reclaimed water which is stored or used for aesthetic enjoyment or landscape irrigation or which otherwise serves a similar function and is not intended to include public contact.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.620. Nonrestricted Recreational Impoundment

"Nonrestricted recreational impoundment" means an impoundment of reclaimed water, in which no limitations are imposed on body-contact water recreational activities.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.650. Oxidized Wastewater

"Oxidized wastewater" means wastewater in which the organic matter has been stabilized, is nonputrescible, and contains dissolved oxygen.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.710. Reclamation Plant

"Reclamation plant" means an arrangement of devices, structures, equipment, processes and controls which produce reclaimed water.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.750. Restricted Access Golf Course

"Restricted access golf course" means a golf course where public access is controlled so that areas irrigated with reclaimed water cannot be used as if they were part of a park, playground, or school yard and where irrigation is conducted only in areas and during periods when the golf course is not being used by golfers.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.800. Spray Irrigation

"Spray irrigation" means the application of reclaimed water to crops to maintain vegetation or support growth of vegetation by applying it from sprinklers or orifices in piping. Spray irrigation does not include drip irrigation.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60301.900. Undisinfected Secondary Reclaimed Water

"Undisinfected secondary reclaimed water" means oxidized wastewater.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

ARTICLE 2. IRRIGATION-OF-FOOD-CROPS USES OF RECLAIMED WATER

Section-60303---Spray-Irrigation

Reclaimed-water-used-for-the-spray-irrigation-of-feed-crops-shall be-at-all-times-an-adequately-disinfected,-oxidized,-coagulated, clarified,--filtered--wastewater.-----The--wastewater--shall--be considered-adequately-disinfected-if-at-some-location-in-the treatment-process-the-median-number-of-coliform-organisms-dees not-exceed-2.2-per-100-milliliters-and-the-number-of-coliform organisms-dees-not-exceed-23-per-100-milliliters-in-more-than-one sample-within-a-30-day-period.----The-median-value-shall-be determined-from-the-bacteriological-results-of-the-last-7-days for-which-analyses-have-been-completed.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section-60307.--Exceptions

**Exceptions-to-the-quality-requirements-for-reclaimed-water-used
for-irrigation-of-food-crops-may-be-considered-by-the-State
Department-of-Health-on-an-individual-case-basis-where-the
reclaimed-water-is-to-be-used-to-irrigate-a-food-crop-which-must
undergo-extensive-commercial--physical-or-chemical-processing
sufficient-to-destroy-pathogenic-agents-before-it-is-suitable-for
human-consumption.**

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section-60311.--Pasture-for-Milking-Animals

Reclaimed-water-used-for-the-irrigation-of-pasture-to-which
milking-cows-or-goats-have-access-shall-be-at-all-times-an
adequately-disinfected,-oxidized-wastewater.---The-wastewater
shall-be-considered-adequately-disinfected-if-at-some-location-in
the-treatment-process-the-median-number-of-coliform-organisms
does-not-exceed-23-per-100-milliliters-as-determined-from-the
bacteriological-results-of-the-last-7-days-for-which-analyses
have-been-completed.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

ARTICLE 5. -- Recreational Impoundments

Section 60315. -- Nonrestricted Recreational Impoundment

Reclaimed water used as a source of supply in a nonrestricted recreational impoundment shall be at all times an adequately disinfected, --- oxidized, --- coagulated, --- clarified, --- filtered wastewater. --- The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. --- The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section-60319.--Landscape-impoundment

Reclaimed-water-used-as-a-source-of-supply-in-a-landscape
impoundment-shall-be-at-all-times-an-adequately-disinfected,
oxidized--wastewater.----The--wastewater--shall--be--considered
adequately-disinfected-if-at-some-location-in-the-treatment
process-the-median-number-of-coli-form-organisms-does-not-exceed
23-per-100-milliliters,-as-determined-from-the-bacteriological
results--of--the--last--7--days--for--which--analyses--have--been
completed-

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60303. Use of Reclaimed Water for Irrigation

(a) Reclaimed water used for the irrigation of the following shall be a disinfected tertiary reclaimed water except that coagulation need not be used as part of the treatment process provided the turbidity of the influent to the filters does not exceed 5 NTU more than 5 percent of the time:

- (1) Food crops where the reclaimed water comes into contact with the edible portion of the crop. This includes all edible root crops.
- (2) Parks and playgrounds
- (3) School yards
- (4) Residential landscaping
- (5) Unrestricted access golf courses
- (6) Any other irrigation use not specified in this section and not prohibited by other sections of the California Code of Regulations.

(b) Reclaimed water used for the irrigation of food crops where the edible portion is produced above ground and not contacted by the reclaimed water shall be at least disinfected secondary-2.2 reclaimed water.

(c) Reclaimed water used for the irrigation of the following shall be at least disinfected secondary-23 reclaimed water:

- (1) Cemeteries
- (2) Freeway landscaping
- (3) Restricted access golf courses
- (4) Ornamental nursery stock and sod farms where access by the general public is not restricted
- (5) Pasture for animals producing milk for human consumption
- (6) Any nonedible vegetation where access is controlled so that the irrigated area cannot be used as if it were part of a park, playground or school yard

(d) Reclaimed wastewater used for the irrigation of the following shall be at least undisinfected secondary reclaimed water:

Section 60304. Use of Reclaimed Water For Impoundments

(a) Except as provided in subsection (b), reclaimed water used as a source of water supply for nonrestricted recreational impoundments shall be disinfected tertiary reclaimed water that has been subjected to conventional treatment.

(b) Disinfected tertiary reclaimed water that has not received conventional treatment may be used for nonrestricted recreational impoundments provided the reclaimed water is monitored for the presence of pathogenic organisms in accordance with the following:

(1) During the first 12 months of operation and use the reclaimed water shall be sampled and analyzed monthly for giardia, enteric viruses, and cryptosporidium. Following the first 12 months of use, the reclaimed water shall be sampled and analyzed quarterly for giardia, enteric viruses, and cryptosporidium. The ongoing monitoring may be discontinued after the first two years of operation with the approval of the department. This monitoring shall be in addition to the monitoring set forth in Section 60321.

(2) The samples shall be taken at a point following disinfection and prior to the point where the reclaimed water enters the use impoundment. The samples shall be analyzed by an approved laboratory and the results submitted quarterly to the regulatory agency.

(c) The total coliform bacteria concentrations in reclaimed water used for nonrestricted recreational impoundments, measured at a point between the disinfection process and the point of entry to the use impoundment, shall comply with the criteria specified in section 60301.230 (b) for disinfected tertiary reclaimed water.

(d) Reclaimed water used as a source of supply for restricted recreational impoundments and for any publicly accessible impoundments at fish hatcheries shall be at least disinfected secondary-2.2 reclaimed water.

(e) Reclaimed water used as a source of supply for landscape impoundments that do not utilize decorative fountains shall be at least disinfected secondary-23 reclaimed water.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

Section 60306. Use of Reclaimed Water for Other Purposes

(a) Reclaimed water used for the following shall be disinfected tertiary reclaimed water except that coagulation need not be used as part of the treatment process provided the turbidity of the influent to the filters does not exceed 5 NTU more than 5 percent of the time:

- (1) Flushing toilets and urinals
- (2) Priming drain traps
- (3) Industrial process water that may come into contact with workers
- (4) Structural fire fighting
- (5) Decorative fountains
- (6) Commercial laundries
- (7) Consolidation of backfill around potable water pipelines
- (8) Artificial snow making for commercial outdoor use
- (9) Commercial car washes where the washing is not done by hand and where the general public is excluded from the washing process.

(b) Reclaimed water used for the following uses shall be at least disinfected secondary-23 reclaimed water:

- (1) Industrial boiler feed
- (2) Nonstructural fire fighting
- (3) Backfill consolidation around nonpotable piping
- (4) Soil compaction
- (5) Mixing concrete
- (6) Dust control on roads and streets
- (7) Cleaning roads, sidewalks and outdoor work areas

ARTICLE 3. USE AREA REQUIREMENTS

Section 60310. Use Area Requirements

(a) (1) No irrigation with disinfected tertiary reclaimed water shall take place within 50 feet of any domestic water supply well unless all of the following conditions have been met:

(A) A geological investigation demonstrates that an aquitard exists at the well between the uppermost aquifer being drawn from and the ground surface.

(B) The well contains an annular seal that extends from the surface into the aquitard.

(C) The well is housed to prevent any reclaimed water spray from coming into contact with the wellhead facilities.

(D) The ground surface immediately around the wellhead is contoured to allow surface water to drain away from the well.

(E) The owner of the well approves of the elimination of the buffer zone requirement.

(2) No impoundment of disinfected tertiary reclaimed water shall occur within 100 feet of any domestic water supply well.

(b) No irrigation with, or impoundment of, disinfected secondary-2.2 or disinfected secondary-23 reclaimed water shall take place within 100 feet of any domestic water supply well.

(c) No irrigation with, or impoundment of, undisinfected secondary reclaimed water shall take place within 150 feet of any domestic water supply well.

(d) Any use of reclaimed water shall comply with the following:

(1) Any irrigation runoff shall be confined to the reclaimed water use area unless otherwise authorized by the regulatory agency.

(2) Spray, mist, or runoff shall not enter a dwelling, designated outdoor eating areas, or a food handling facility.

ARTICLE 4 DUAL PLUMBED RECLAIMED WATER SYSTEMS

Section 60313. General Requirements

(a) No person other than a reclaimed water agency shall deliver reclaimed water to a facility.

(b) No reclaimed water agency shall deliver reclaimed water for internal use to Group R occupancies as defined in the Uniform Building Code (1985 Edition) or any facility for the production or processing of food products or beverages. This does not include a cafeteria or snack bar in a facility whose primary function does not involve the production or processing of foods or beverages.

(c) No reclaimed water agency shall deliver reclaimed water to a facility using a dual plumbed system unless the report required pursuant to Section 13522.5 of the Water Code, and which meets the criteria set forth in Section 60314, has been submitted to the regulatory agency by the reclaimed water agency.

Authority Cited: Section 13521 Water Code

Reference Cited: Sections 13521, 13522.5, 13523.1, 13553 and 13554 Water Code

information required by this section. Plans and specifications for individual facilities covered by the report may be submitted at any time prior to the delivery of reclaimed water to the facility.

Authority Cited: Sections 13521 and 13522.5 Water Code and 4023.3 Health and Safety Code

Reference Cited: Sections 13521, 13522.5, 13523.1, 13553 and 13554 Water Code

Section 60316. Operation Requirements

(a) Prior to the initial operation of the reclaimed water system and annually thereafter, the dual plumbed system within each facility and use area shall be inspected for possible cross connections with the potable water system. The reclaimed water system shall also be tested for possible cross connections at least once every four years. The testing shall be conducted in accordance with the method described in the report submitted pursuant to Section 60314. The inspections and the testing shall be performed by a cross connection control specialist certified by the California-Nevada Section of the American Water Works Association or by another entity that has been approved by the Department. A written report documenting the result of the inspection and testing for the prior year shall be submitted to the department within 30 days following completion of the testing.

(b) The reclaimed water agency shall notify the department of any incidence of backflow of reclaimed water into the potable water system within 24 hours of the finding of the incident.

(c) Any backflow prevention device installed to protect the public water system shall be inspected and maintained in accordance with Section 7605 of Title 17.

Authority Cited: Sections 13521 Water Code and 4023.3 Health and Safety Code

Reference Cited: Sections 13521, 13553 and 13554 Water Code

ARTICLE 6. SAMPLING AND ANALYSIS

Section 60321. Sampling and Analysis

(a). Disinfected secondary-23, disinfected secondary-2.2, and disinfected tertiary reclaimed water shall be sampled at least once daily for total coliform bacteria. The samples shall be taken from the disinfected effluent and shall be analyzed by an approved laboratory.

(b). Disinfected tertiary reclaimed water shall be continuously sampled for turbidity using a continuous turbidity meter and recorder at a point prior to filtration and again following filtration. Turbidity measurements shall be based on a reading and recording of the turbidity strip charts or computer records at four-hour intervals at least once per day. Compliance with the daily average operating turbidity shall be determined by averaging the results of all four-hour turbidity samples read during the day. The results of the daily average turbidity determinations shall be reported monthly to the regulatory agency.

(c) The required sampling shall be conducted by the producer or supplier of the reclaimed water.

Authority cited: Section 13521, Water Code

Reference cited: Sections 13520 and 13521, Water Code

~~-----residences-using-reclaimed-water-for-landscape
-----irrigation-as-part-of-an-approved-dual-plumbed-use
-----area-as-defined-in-Section-60312.~~

{4}(2) Premises where hazardous substances are handled in any manner in which the substances may enter the potable water system. This does not include a single-family residence that has a sewage lift pump. A RP may be provided in lieu of an AG if approved by the health agency and water supplier. AG

{5}(3) Premises where there are irrigation systems into which fertilizers, herbicides, or pesticides are, or can be, injected. RP

(b) Auxiliary Water Supplies

(1) Premises where there is an unapproved auxiliary water supply which is interconnected with the public water system. A RP or DC may be provided in lieu of an AG if approved by the health agency and water supplier. AG

(2) Premises where there is an unapproved auxiliary water supply and there are no interconnections with the public water system. A DC may be provided in lieu of a RP if approved by the health agency and water supplier. RP

(c) Reclaimed Water

(1) Premises where the public water system is used to supplement the reclaimed water supply. AG

(2) Premises where reclaimed water is used, other than as allowed in subsection (3), and there is no interconnection with the potable water system. RP

(3) Residences using reclaimed water for landscape irrigation as part of an approved dual plumbed use area established pursuant to sections 60313 through 60316 unless the reclaimed water supplier obtains approval of the local public water supplier, or the Department if the water supplier is also the supplier of the reclaimed water, to utilize an alternative backflow protection plan. DC

{e}(d) Fire Protection Systems

(1) Premises where the fire system is directly DC

Appendix B

State Water Code

**WASTEWATER
RECLAMATION CRITERIA**

An Excerpt from the

**CALIFORNIA ADMINISTRATIVE CODE
TITLE 22, DIVISION 4**

ENVIRONMENTAL HEALTH



1978

**STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
SANITARY ENGINEERING SECTION
2151 Berkeley Way, Berkeley 94704**

INTENT OF REGULATIONS

The intent of these regulations is to establish acceptable levels of constituents of reclaimed water and to prescribe means for assurance of reliability in the production of reclaimed water in order to ensure that the use of reclaimed water for the specified purposes does not impose undue risks to health. The levels of constituents in combination with the means for assurance of reliability constitute reclamation criteria as defined in Section 13520 of the California Water Code.

As affirmed in Sections 13510 to 13512 of the California Water Code, water reclamation is in the best public interest and the policy of the State is to encourage reclamation. The reclamation criteria are intended to promote development of facilities which will assist in meeting water requirements of the State while assuring positive health protection. Appropriate surveillance and control of treatment facilities, distribution systems, and use areas must be provided in order to avoid health hazards. Precautions must be taken to avoid direct public contact with reclaimed waters which do not meet the standards specified in Article 5 for nonrestricted recreational impoundments.

TABLE OF CONTENTS

CHAPTER 3. RECLAMATION CRITERIA

Section	Definitions	Article 1. Definitions
60301.		
Section		Article 2. Irrigation of Food Crops
60303.	Spray Irrigation	
60305.	Surface Irrigation	
60307.	Exceptions	
Section		Article 3. Irrigation of Fodder, Fiber, and Seed Crops
60309.	Fodder, Fiber, and Seed Crops	
60311.	Pasture for Milking Animals	
Section		Article 4. Landscape Irrigation
60313.	Landscape Irrigation	
Section		Article 5. Recreational Impoundments
60315.	Nonrestricted Recreational Impoundment	
60317.	Restricted Recreational Impoundment	
60319.	Landscape Impoundment	
Section		Article 5.1. Groundwater Recharge
60320.	Groundwater Recharge	
Section		Article 5.5. Other Methods of Treatment
60320.5.	Other Methods of Treatment	
Section		Article 6. Sampling and Analysis
60321.	Sampling and Analysis	
Section		Article 7. Engineering Report and Operational Requirements
60323.	Engineering Report	
60325.	Personnel	
60327.	Maintenance	
60329.	Operating Records and Reports	
60331.	Bypass	
Section		Article 8. General Requirements of Design
60333.	Flexibility of Design	
60335.	Alarms	
60337.	Power Supply	
Section		Article 9. Alternative Reliability Requirements for Uses Permitting Primary Effluent
60339.	Primary Treatment	

(m) **Primary Effluent.** Primary effluent is the effluent from a wastewater treatment process which provides removal of sewage solids so that it contains not more than 0.5 milliliter per liter per hour of settleable solids as determined by an approved laboratory method.

(n) **Oxidized Wastewater.** Oxidized wastewater means wastewater in which the organic matter has been stabilized, is nonputrescible, and contains dissolved oxygen.

(o) **Biological Treatment.** Biological treatment means methods of wastewater treatment in which bacterial or biochemical action is intensified as a means of producing an oxidized wastewater.

(p) **Secondary Sedimentation.** Secondary sedimentation means the removal by gravity of settleable solids remaining in the effluent after the biological treatment process.

(q) **Coagulated Wastewater.** Coagulated wastewater means oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated by the addition of suitable flocc-forming chemicals or by an equally effective method.

(r) **Filtered Wastewater.** Filtered wastewater means an oxidized, coagulated, clarified wastewater which has been passed through natural undisturbed soils or filter media, such as sand or diatomaceous earth, so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

(s) **Disinfected Wastewater.** Disinfected wastewater means wastewater in which the pathogenic organisms have been destroyed by chemical, physical or biological means.

(t) **Multiple Units.** Multiple units means two or more units of a treatment process which operate in parallel and serve the same function.

(u) **Standby Unit Process.** A standby unit process is an alternate unit process or an equivalent alternative process which is maintained in operable condition and which is capable of providing comparable treatment for the entire design flow of the unit for which it is a substitute.

(v) **Power Source.** Power source means a source of supplying energy to operate unit processes.

(w) **Standby Power Source.** Standby power source means an automatically actuated self-starting alternate energy source maintained in immediately operable condition and of sufficient capacity to provide necessary service during failure of the normal power supply.

(x) **Standby Replacement Equipment.** Standby replacement equipment means reserve parts and equipment to replace broken-down or worn-out units which can be placed in operation within a 24-hour period.

(y) **Standby Chlorinator.** A standby chlorinator means a duplicate chlorinator for reclamation plants having one chlorinator and a duplicate of the largest unit for plants having multiple chlorinator units.

(z) **Multiple Point Chlorination.** Multiple point chlorination means that chlorine will be applied simultaneously at the reclamation plant and at subsequent chlorination stations located at the use area and/or some intermediate point. It does not include chlorine application for odor control purposes.

(aa) **Alarm.** Alarm means an instrument or device which continuously monitors a specific function of a treatment process and automatically gives warning of an unsafe or undesirable condition by means of visual and audible signals.

(bb) **Person.** Person also includes any private entity, city, county, district, the State or any department or agency thereof.

NOTE: Authority cited, Section 806, Health and Safety Code and Section 13521, Water Code. Reference: Section 13521, Water Code.

HISTORY: 1. New Chapter 4 (§§ 60301-60357, not consecutive) filed 4-2-75; effective thirtieth day thereafter (Register 75, No. 14).

2. Renumbering of Chapter 4 (Sections 60301-60357, not consecutive) to Chapter 3 (Sections 60301-60357, not consecutive), filed 10-14-77; effective thirtieth day thereafter (Register 77, No. 42).

Article 2. Irrigation of Food Crops

60303. **Spray Irrigation.** Reclaimed water used for the spray irrigation of food crops shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.

60305. **Surface Irrigation.** (a) Reclaimed water used for surface irrigation of food crops shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

(b) Orchards and vineyards may be surface irrigated with reclaimed water that has the quality at least equivalent to that of primary effluent provided that no fruit is harvested that has come in contact with the irrigating water of the ground.

60307. **Exceptions.** Exceptions to the quality requirements for reclaimed water used for irrigation of food crops may be considered by the State Department of Health on an individual case basis where the reclaimed water is to be used to irrigate a food crop which must undergo extensive commercial, physical or chemical processing sufficient to

CHAPTER 3. RECLAMATION CRITERIA

Section
60341. Emergency Storage or Disposal
60343. Primary Treatment
60345. Biological Treatment
60347. Secondary Sedimentation
60349. Coagulation
60351. Filtration
60353. Disinfection
60355. Other Alternatives to Reliability Requirements

Article 10 Alternative Reliability Requirements for Uses Requiring Oxidized,
Disinfected Wastewater or Oxidized, Coagulated, Clarified, Filtered,
Disinfected Wastewater

Article 1. Definitions

60301. Definitions. (a) Reclaimed Water. Reclaimed water means water which, as a result of treatment of domestic wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.

(b) Reclamation Plant. Reclamation plant means an arrangement of devices, structures, equipment, processes and controls which produce a reclaimed water suitable for the intended reuse.

(c) Regulatory Agency. Regulatory agency means the California Regional Water Quality Control Board in whose jurisdiction the reclamation plant is located.

(d) Direct Beneficial Use. Direct beneficial use means the use of reclaimed water which has been transported from the point of production to the point of use without an intervening discharge to waters of the State.

(e) Food Crops. Food crops mean any crops intended for human consumption.

(f) Spray Irrigation. Spray irrigation means application of reclaimed water to crops by spraying it from orifices in piping.

(g) Surface Irrigation. Surface irrigation means application of reclaimed water by means other than spraying such that contact between the edible portion of any food crop and reclaimed water is prevented.

(h) Restricted Recreational Impoundment. A restricted recreational impoundment is a body of reclaimed water in which recreation is limited to fishing, boating, and other non-body-contact water recreation activities.

(i) Nonrestricted Recreational Impoundment. A nonrestricted recreational impoundment is an impoundment of reclaimed water in which no limitations are imposed on body-contact water sport activities.

(j) Landscape Impoundment. A landscape impoundment is a body of reclaimed water which is used for aesthetic enjoyment or which otherwise serves a function not intended to include public contact.

(k) Approved Laboratory Methods. Approved laboratory methods are those specified in the latest edition of "Standard Methods for the Examination of Water and Wastewater", prepared and published jointly by the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation and which are conducted in laboratories approved by the State Department of Health.

(l) Unit Process. Unit process means an individual stage in the wastewater treatment sequence which performs a major single treatment operation.

Article 3. Irrigation of Fodder, Fiber, and Seed Crops

60309. Fodder, Fiber, and Seed Crops. Reclaimed water used for the surface or spray irrigation of fodder, fiber, and seed crops shall have a level of quality no less than that of primary effluent.

60311. Pasture for Milking Animals. Reclaimed water used for the irrigation of pasture to which milking cows or goats have access shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

Article 4. Landscape Irrigation

60313. Landscape Irrigation. (a) Reclaimed water used for the irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has similar access or exposure shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 milliliters in any two consecutive samples.

(b) Reclaimed water used for the irrigation of parks, playgrounds, schoolyards, and other areas where the public has similar access or exposure shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater or a wastewater treated by a sequence of unit processes that will assure an equivalent degree of treatment and reliability. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 22 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 23 per 100 milliliters in any sample.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

History: 1. Amendment filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).

Article 5. Recreational Impoundments

60315. Nonrestricted Recreational Impoundment. Reclaimed water used as a source of supply in a nonrestricted recreational impoundment shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 22 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.

60317. Restricted Recreational Impoundment. Reclaimed water used as a source of supply in a restricted recreational impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 22 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

60319. Landscape Impoundment. Reclaimed water used as a source of supply in a landscape impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

Article 5.1. Groundwater Recharge

60320. Groundwater Recharge. (a) Reclaimed water used for groundwater recharge of domestic water supply aquifers by surface spreading shall be at all times of a quality that fully protects public health. The State Department of Health Services' recommendations to the Regional Water Quality Control Boards for proposed groundwater recharge projects and for expansion of existing projects will be made on an individual case basis where the use of reclaimed water involves a potential risk to public health.

(b) The State Department of Health Services' recommendations will be based on all relevant aspects of each project, including the following factors: treatment provided; effluent quality and quantity; spreading area operations; soil characteristics; hydrogeology; residence time; and distance to withdrawal.

(c) The State Department of Health Services will hold a public hearing prior to making the final determination regarding the public health aspects of each groundwater recharge project. Final recommendations will be submitted to the Regional Water Quality Control Board in an expeditious manner.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

History: 1. New Article 5.1 (Section 60320) filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).

Article 5.5. Other Methods of Treatment

60320.5. Other Methods of Treatment. Methods of treatment other than those included in this chapter and their reliability features may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the methods of treatment and reliability features will assure an equal degree of treatment and reliability.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

History: 1. Renumbering of Article 11 (Section 60337) to Article 5.5 (Section 60320.5) filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).

Article 6. Sampling and Analysis

60321. Sampling and Analysis. (a) Samples for settleable solids and coliform bacteria, where required, shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. Turbidity analysis, where required, shall be performed by a continuous recording turbidimeter.

(b) For uses requiring a level of quality no greater than that of primary effluent, samples shall be analyzed by an approved laboratory method of settleable solids.

(c) For uses requiring an adequately disinfected, oxidized wastewater, samples shall be analyzed by an approved laboratory method for coliform bacteria content.

(d) For uses requiring an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater, samples shall be analyzed by approved laboratory methods for turbidity and coliform bacteria content.

Article 7. Engineering Report and Operational Requirements

60323. Engineering Report. (a) No person shall produce or supply reclaimed water for direct reuse from a proposed water reclamation plant unless he files an engineering report.

(b) The report shall be prepared by a properly qualified engineer registered in California and experienced in the field of wastewater treatment, and shall contain a description of the design of the proposed reclamation system. The report shall clearly indicate the means for compliance with these regulations and any other features specified by the regulatory agency.

(c) The report shall contain a contingency plan which will assure that no untreated or inadequately-treated wastewater will be delivered to the use area.

60325. Personnel. (a) Each reclamation plant shall be provided with a sufficient number of qualified personnel to operate the facility effectively so as to achieve the required level of treatment at all times.

(b) Qualified personnel shall be those meeting requirements established pursuant to Chapter 9 (commencing with Section 13625) of the Water Code.

60327. Maintenance. A preventive maintenance program shall be provided at each reclamation plant to ensure that all equipment is kept in a reliable operating condition.

60329. Operating Records and Reports. (a) Operating records shall be maintained at the reclamation plant or a central depository within the operating agency. These shall include: all analyses specified in the reclamation criteria; records of operational problems, plant and equipment breakdowns, and diversions to emergency storage or disposal; all corrective or preventive action taken.

(Next page is 1605)

(h) Process or equipment failures triggering an alarm shall be recorded and maintained as a separate record file. The recorded information shall include the time and cause of failure and corrective action taken.

(c) A monthly summary of operating records as specified under (a) of this section shall be filed monthly with the regulatory agency.

(d) Any discharge of untreated or partially treated wastewater to the use area, and the cessation of same, shall be reported immediately by telephone to the regulatory agency, the State Department of Health, and the local health officer.

60331. Bypass. There shall be no bypassing of untreated or partially treated wastewater from the reclamation plant or any intermediate unit processes to the point of use.

Article 8. General Requirements of Design

60332. Flexibility of Design. The design of process piping, equipment arrangement, and unit structures in the reclamation plant must allow for efficiency and convenience in operation and maintenance and provide flexibility of operation to permit the highest possible degree of treatment to be obtained under varying circumstances.

60335. Alarms. (a) Alarm devices required for various unit processes as specified in other sections of these regulations shall be installed to provide warning of:

- (1) Loss of power from the normal power supply.
- (2) Failure of a biological treatment process.
- (3) Failure of a disinfection process.
- (4) Failure of a coagulation process.
- (5) Failure of a filtration process.
- (6) Any other specific process failure for which warning is required by the regulatory agency.

(b) All required alarm devices shall be independent of the normal power supply of the reclamation plant.

(c) The person to be warned shall be the plant operator, superintendent, or any other responsible person designated by the management of the reclamation plant and capable of taking prompt corrective action.

(d) Individual alarm devices may be connected to a master alarm to sound at a location where it can be conveniently observed by the attendant. In case the reclamation plant is not attended full time, the alarm(s) shall be connected to sound at a police station, fire station or other full-time service unit with which arrangements have been made to alert the person in charge at times that the reclamation plant is unattended.

60337. Power Supply. The power supply shall be provided with one of the following reliability features:

- (a) Alarm and standby power source.
- (b) Alarm and automatically actuated short-term retention or disposal provisions as specified in Section 60341.
- (c) Automatically actuated long-term storage or disposal provisions

Article 9. Alternative Reliability Requirements for Uses Permitting Primary Effluent

60339. Primary Treatment. Reclamation plants producing reclaimed water exclusively for uses for which primary effluent is permitted shall be provided with one of the following reliability features:

(a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Long-term storage or disposal provisions as specified in Section 60341.

Article 10. Alternative Reliability Requirements for Uses Requiring Oxidized, Disinfected Wastewater or Oxidized, Coagulated, Clarified, Filtered, Disinfected Wastewater

60341. Emergency Storage or Disposal. (a) Where short-term retention or disposal provisions are used as a reliability feature, these shall consist of facilities reserved for the purpose of storing or disposing of untreated or partially treated wastewater for at least a 24-hour period. The facilities shall include all the necessary diversion devices, provisions for odor control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(b) Where long-term storage or disposal provisions are used as a reliability feature, these shall consist of ponds, reservoirs, percolation areas, downstream sewers leading to other treatment or disposal facilities or any other facilities reserved for the purpose of emergency storage or disposal of untreated or partially treated wastewater. These facilities shall be of sufficient capacity to provide disposal or storage of wastewater for at least 20 days, and shall include all the necessary diversion works, provisions for odor and nuisance control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(c) Diversion to a less demanding reuse is an acceptable alternative to emergency disposal of partially treated wastewater provided that the quality of the partially treated wastewater is suitable for the less demanding reuse.

(d) Subject to prior approval by the regulatory agency, diversion to a discharge point which requires lesser quality of wastewater is an acceptable alternative to emergency disposal of partially treated wastewater.

(e) Automatically actuated short-term retention or disposal provisions and automatically actuated long-term storage or disposal provisions shall include, in addition to provisions of (a), (b), (c), or (d) of this section, all the necessary sensors, instruments, valves and other devices to enable fully automatic diversion of untreated or partially treated wastewater to approved emergency storage or disposal in the event of failure of a treatment process, and a manual reset to prevent automatic restart until the failure is corrected.

- (c) Alarm and long-term storage or disposal provisions.
(d) Automatically actuated long-term storage or disposal provisions.
(e) Alarm and standby filtration unit process.

60353. Disinfection.

(a) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with the following features for uninterrupted chlorine feed:

- (1) Standby chlorine supply;
- (2) Manifold systems to connect chlorine cylinders;
- (3) Chlorine scales; and
- (4) Automatic devices for switching to full chlorine cylinders.

Automatic residual control of chlorine dosage, automatic measuring and recording of chlorine residual, and hydraulic performance studies may also be required.

(b) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with one of the following reliability features:

- (1) Alarm and standby chlorinator;
- (2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;
- (3) Alarm and long-term storage or disposal provisions;
- (4) Automatically actuated long-term storage or disposal provisions; or
- (5) Alarm and multiple point chlorination, each with independent power source, separate chlorinator, and separate chlorine supply.

60355. Other Alternatives to Reliability Requirements. Other alternatives to reliability requirements set forth in Articles 8 to 10 may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the proposed alternative will assure an equal degree of reliability.

60343. Primary Treatment. All primary treatment unit processes shall be provided with one of the following reliability features:

- (a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Standby primary treatment unit process.

(c) Long-term storage or disposal provisions.

60345. Biological Treatment. All biological treatment unit processes shall be provided with one of the following reliability features:

- (a) Alarm and multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation.
- (b) Alarm, short-term retention or disposal provisions, and standby replacement equipment.

(c) Alarm and long-term storage or disposal provisions.

(d) Automatically actuated long-term storage or disposal provisions.

60347. Secondary Sedimentation. All secondary sedimentation unit processes shall be provided with one of the following reliability features:

- (a) Multiple sedimentation units capable of treating the entire flow with one unit not in operation.
- (b) Standby sedimentation unit process.
- (c) Long-term storage or disposal provisions.

60349. Coagulation.

(a) All coagulation unit processes shall be provided with the following mandatory features for uninterrupted coagulant feed:

- (1) Standby feeders;
- (2) Adequate chemical storage and conveyance facilities;
- (3) Adequate reserve chemical supply; and
- (4) Automatic dosage control.

(b) All coagulation unit processes shall be provided with one of the following reliability features:

- (1) Alarm and multiple coagulation units capable of treating the entire flow with one unit not in operation;
- (2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;
- (3) Alarm and long-term storage or disposal provisions;
- (4) Automatically actuated long-term storage or disposal provisions; or
- (5) Alarm and standby coagulation process.

60351. Filtration. All filtration unit processes shall be provided with one of the following reliability features:

- (a) Alarm and multiple filter units capable of treating the entire flow with one unit not in operation.
- (b) Alarm, short-term retention or disposal provisions and standby replacement equipment.

Appendix C

Water Quality Criteria

APPENDIX C

WATER QUALITY CRITERIA

The literature contains many different water quality criteria designed to protect specific beneficial uses of water. A summary of the specific numerical water quality criteria considered by the Regional Board for designation as water quality objectives is described in Table C-1, Water Quality Criteria - Inorganic Constituents; and Table C-2, Water Quality Criteria - Organic Constituents. The water quality criteria summarized in Tables C-1 and C-2 provided the basis for the Regional Board's designation of many of the specific numerical water quality objectives described earlier in this Chapter.

The water quality criteria presented in Tables C-1 and C-2 are not enforceable water quality objectives. The purpose of presenting the information summarized in these tables is to allow interested persons to compare available water quality criteria to the specific water quality objectives designated by the Regional Board described in Chapter 3.

A summary of the available types of numerical water quality criteria considered by the Regional Board for designation as numerical water quality objectives are summarized below.

- ***Maximum Contaminant Levels (MCLs):***

MCLs are part of the drinking water standards adopted both by the California Department of Health Services (DHS), Office of Drinking Water in Title 22 of the California Code of Regulations (CCR), Division 4, Chapter 15, "*Domestic Water Quality and Monitoring*" and by the US EPA under the Safe Drinking Water Act. The State MCL drinking water standards must be at least as stringent as those adopted by US EPA. Primary MCLs are derived from the one in a million incremental cancer risk estimate for carcinogens and from threshold toxicity levels for non-carcinogens. Secondary MCLs are derived from human welfare considerations (e.g., taste or odor).

- ***Maximum Contaminant Level Goals (MCL Goals):***

MCL Goals are promulgated by US EPA under the National Primary Drinking Water Regulations as the first step in establishing MCLs. MCL Goals are set at levels which represent no adverse health risks.

- ***State "Action" Levels:***

Action levels are published by the DHS's Office of Drinking Water and are based mainly on health effects. The 10^{-6} incremental cancer risk estimates are used for carcinogens and threshold toxicity limits are used for other constituents.

- ***Proposition 65 Regulatory Limits:***

Proposition 65 limits are established under the California Safe Drinking Water and Toxic Enforcement Act of 1986 for known human carcinogens and reproductive toxins. For carcinogens the No-Significant-Risk-Levels are set at the one-in-100,000 incremental cancer risk level. 1/1000 of the No-Observable-Effect Level (NOEL) is used for reproductive toxicants.

- ***National Ambient Water Quality Criteria:***

These criteria are published by US EPA under the federal Clean Water Act to protect human health and welfare and freshwater and marine aquatic life. These criteria are found in: *Quality Criteria for Water, 1986* - the "*Gold Book*"; the *Ambient Water Quality Criteria* volumes (1980, 1984, 1986, 1987, and 1989); *Quality Criteria for Water (1976)* - the "*Red*

Book"; and Water Quality Criteria, 1972 - the "Blue Book".

- ***Health Advisories and Water Quality Advisories:***

These advisories are published by US EPA's Office of Water. Short-term (10 days or less), long-term (7 years or less), and lifetime exposure health advisories for non-carcinogens and suspected human health carcinogens are included where sufficient data exist.

- ***Suggested No-Adverse-Response Levels (SNARLS):***

These human health-related criteria are published by the National Academy of Sciences in the *Drinking Water and Health Volumes*. Incremental cancer risk estimates are presented separately for carcinogens.

- ***Water Quality for Agriculture:***

Water Quality for Agriculture was published by the Food and Agriculture Organization of the United Nations in 1985, which contains criteria protective of agricultural uses of water.

- ***Water Quality Criteria:***

Water Quality Criteria was written by McKee and Wolf and published by the State Water Resources Control Board in 1963 and 1978. It contains criteria for human health and welfare, aquatic life, agricultural use, industrial use, and various other beneficial uses.

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal Maximum Contaminant Levels (MCLs))			
	Ocean Waters (1) *f* = carcinogen	Bays and Estuaries	Intend Surface Waters	Ground Water	California Dept. of Health Services	US EPA	Secondary MCL	Primary MCL
					Primary MCL			
Ammonia	600 (2)	NH3 not > 0.025 mg/l	NH3 not > 0.025 mg/l					8 (8)
Antimony	1200							50
Arsenic	8				50			4 (8)
Beryllium	0.033 f		0.5 mg/l or as noted in Table 3-1	0.5 mg/l or as noted in Table 3-2				
Boron								
Bromide					10			5
Cadmium	1		250 mg/l or as noted in Table 3-1	50 mg/l or as noted in Table 3-2		250,000 (7)		
Chloride								
Chlorine	2 (3)							
Chromium (III)	190,000							100
Chromium (VI)	2 (4)				50			
Chromium (total)	2 (4)		20 units or as noted in Table 3-1	15 units or as noted in Table 3-2		15 units		
Color						1000		1300 (9)
Copper	3							200 (8)
Cyanide	1							4000
Fluoride			1.0 mg/l or as noted in Table 3-1	1.0 mg/l or as noted in Table 3-2	1400 to 2400 (5)			
Iron			0.3 mg/l or as noted in Table 3-1	0.3 mg/l or as noted in Table 3-2		300		15 (9)
Lead	2				50			
Manganese			0.05 mg/l or as noted in Table 3-1	0.05 mg/l or as noted in Table 3-2	2	50		2
Mercury (inorganic)	0.04							100 (8)
Nickel	5							
Nitrate			5 mg/l or as noted in Table 3-1	5 mg/l or as noted in Table 3-2	45,000 (6)			10,000 (10)

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate and notes following the tables.
WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)		
	Ocean Waters (1) "1" = carcinogen	Bays and Estuaries	Inland Surface Waters	Ground Water	California Dept. of Health Services Primary MCL	Secondary MCL	US EPA Primary MCL
Oxygen, dissolved	Shall not be depressed > 10%	Shall not be less than 5.0 mg/l with designated MAR. The annual mean DO shall not be less than 7 mg/l more than 10% of the time.	Shall not be less than 5.0 mg/l in inland surface waters with WARM or less than 6.0 mg/l in waters with COLD beneficial use. The annual mean D.O. conc. shall not be less than 7 mg/l more than 10% of the time.				
pH	Shall not be +/- 0.2 units of natural pH	Shall not be depressed below 7.0; nor raised above 9.0. Changes in normal ambient pH shall not exceed 0.2 units.	Shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 units in fresh waters with designated COLD or WARM beneficial uses.				
Phosphorus			Shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water; for flowing waters, shall not exceed 0.1 mg/l total P. These values not to be exceeded more than 10% of the time.		15 pCi/l		15 pCi/l (12)
Radioactivity, Gross Alpha							
Radioactivity, Gross Beta					50 pCi/l		4 mrem/yr
Radium 226 + 228					5 pCi/l		5 pCi/l / 20 pCi/l (13)
Selenium	15				10		50
Settleable solids			Shall not contain suspended and settleable solids in concentrations that result in the deposition of solids that cause nuisance or adversely affect beneficial uses.				
Silver	0.7				50		100
Sodium			60% Na; or as noted in Table 3-1	60% Na; or as noted in Table 3-2			
Strontium-90					8 pCi/l		400,000-500,000 (13)
Sulfate			65 mg/l; or as noted in Table 3-1	60 mg/l; or as noted in Table 3-2		280,000 (7)	
Total dissolved solids (TDS)			300 mg/l; or as noted in Table 3-1	350 mg/l; or as noted in Table 3-2		500,000 (11)	
Thallium	14						2 (8)
Tritium					20,000 pCi/l		
Turbidity		Shall not be less than 50% of the depth at locations where measurement is made by means of a standard Secchi disk, or as noted in Chapter 3 page 15.	20 NTU; or as noted in Table 3-1. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.	5 NTU; or as noted in Table 3-2. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.		5 units	1 to 5 units
Uranium					20 pCi/l		20 µg/l = 30 pCi/l (13)
Zinc	20					5000	

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal)		California Recommended Public Health Level (RPHL) Department of Health Services	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	Maximum Contaminant Levels (MCLs)			US EPA	National Academy of Sciences (NAS)		CalEPA Cancer Potency Factor as a Water Quality Criterion (17)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL		
	Secondary MCL	MCL Goal									
Ammonia				30,000 (14)					(D)		
Antimony				3		2.8			(D)		
Arsenic								0.02	0.02 (A,14)	5	100
Beryllium				4000 / 20,000 (7-yr,14,15)				0.008	0.008 (B,14)	(18)	100
Boron				800 (14)		630			(D)		750 (22) / 700
Bromide					2300						
Cadmium		5		5	5	3.5	(18)		(D)	(18)	10
Chloride	250,000										106,000
Chlorine						1050			(D)		
Chromium (III)											
Chromium (VI)							0.083		(A)	(18)	100
Chromium (total)		100		100		35			(D)		
Color	15 units										
Copper	1000	1300							(D)		200
Cyanide		200 (8)		200		150			(D)		
Fluoride	2000	4000				840			(D)		1000
Iron	300										5000
Lead		zero							(B)	0.25 (20)	5000
Manganese	50					980					200
Mercury(inorganic)		2	2 (13)	2		2.1			(D)		
Nickel		100 (8)		100		140	(18)		(D)	(18)	200
Nitrate		10,000 (2)		10,000 (2)		11,000 (2)			(D)		

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	Drinking Water Standards (Federal)			California Recommended Public Health Level (RPHL) Department of Health Services	Health Advisories or Suggested No-Adverse-Response Levels (SNARLs) for toxicity other than cancer risk		US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (16)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water			California Proposition 65 Regulatory Level as a Water Quality Criterion (19)	Agricultural Water Quality Goals (21)
	Maximum Contaminant Levels (MCLs)	US EPA	MCL Goal		US EPA	National Academy of Sciences (NAS)		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (17)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL		
Oxygen, dissolved												
pH	6.5 to 8.5 units											
Phosphorus					0.1 (23)					(D)		
Radioactivity, Gross Alpha		zero								(A)		
Radioactivity, Gross Beta		zero								0.04 mrem/yr (A, 14)		
Radium 226 + 228		zero (13)								0.22-0.26 pCi/l (A, 14)		20
Selenium		50					35					
Settleable solids												
Silver					100 (14)		35			(D)		
Sodium					2000 (24)							
Strontium-90										(A)		
Sulfate	250,000	400,000-500,000 (13)										450,000
Total dissolved solids (TDS)	500,000											
Thallium		0.5 (8)			0.4		0.5					
Tritium										(A)		
Turbidity												
Uranium		zero (13)				35				1.7 pCi/l (A)		
Zinc	5000				2000		2100			(D)		2000

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria				Freshwater Aquatic Life Protection			
	Health and Welfare Protection		Recommended Criteria		Additional Toxicity Information		Chronic	Other
	Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Acute	
Ammonia				(26)		(26)		
Antimony	14 / 4300 (25)			30 (13,27)		88 (13,27)	9000	610 (42)
Arsenic		0.018 / 0.14 (25)		190 (27)		360 (27)	850 (41)	48 (43)
Beryllium							130	5.3
Boron								
Bromide								
Cadmium				0.55 (28,29)		1.4 (28,36)		
Chloride	250,000			230,000 (30)		860,000 (30)		
Chlorine				11 (31)		19 (31)		
Chromium (III)				98 (28,32)		820 (28,37)		
Chromium (VI)				11		16		
Chromium (total)								
Color								
Copper			1000	5.4 (28,33)		7.5 (28,38)		
Cyanide	700 / 220,000 (28)			5.2		22		
Fluoride								
Iron			300				1000	
Lead				0.99 (28,34)		25 (28,39)		
Manganese			50					
Mercury (inorganic)	0.14 / 0.15 (25)			0.012		2.4		
Nickel	610 / 4800 (25)			73 (28,35)		653 (28,40)		
Nitrate	10,000 (2)							

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	U.S. EPA National Ambient Water Quality Criteria				Freshwater Aquatic Life Protection				Additional Toxicity Information	
	Health and Welfare Protection		Recommended Criteria		Recommended Criteria		Additional Toxicity Information		Additional Toxicity Information	
	Non-Cancer Public Health Effects	One-In-a-Million Incremental Cancer Risk Estimate	Taste & Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
Oxygen, dissolved				(22)	(22)					
pH			5 to 9 units				6.5 to 9.0 units			
Phosphorus										
Radioactivity, Gross Alpha										
Radioactivity, Gross Beta										
Radium 226 + 228				5		20				
Selenium										
Settleable solids										
Silver				0.12 (13)		0.84 (28.44)			0.12	
Sodium										
Strontium-90										
Sulfate			250,000							
Total dissolved solids (TDS)										
Thallium	1.7 / 6.3 (25)							1400	40	20 (45)
Tributyltin										
Turbidity										
Uranium										
Zinc						54 (28.45)				

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

WATER QUALITY CRITERIA

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria Saltwater Aquatic Life Protection					California Ocean Plan Numerical Water Quality Objectives					
	Recommended Criteria			Additional Toxicity Information		Human Health Protection (30-day Average) *1" = carcinogen	Marine Aquatic Life Protection				
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic		Other	6-month Median			
								30-day Average	7-day Average	Daily Maximum	
Ammonia	35 (47)	233 (47)					600 (2)			2400 (2)	6000 (2)
Antimony	500 (13,27)	1500 (13,27)				13 (43)	8			32	80
Arsenic	36 (27)	69 (27)		2319 (41)			0.033 :				
Beryllium											
Boron											
Bromide							1			4	10
Cadmium	9.3	43									
Chloride							2 (3)			8 (3)	60 (3)
Chlorine	7.5 (48)	13 (48)									
Chromium (III)				10,300 (49)			190,000			8 (4)	20 (4)
Chromium (VI)	80	1100					2 (4)			8 (4)	20 (4)
Chromium (total)											
Color										12	30
Copper	2.9	2.9					3			4	10
Cyanide	1	1					1				
Fluoride											
Iron							2			6	20
Lead	5.5	140									
Manganese			100								
Mercury (inorganic)	0.025	2.1					0.04			0.16	0.4
Nickel	8.3	75					5			20	50
Nitrate											

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA
Page C-9

September 8, 1994

Table C-1. WATER QUALITY CRITERIA - INORGANIC CONSTITUENTS

Inorganic Constituent	US EPA National Ambient Water Quality Criteria						California Ocean Plan					
	Saltwater Aquatic Life Protection						Numerical Water Quality Objectives					
	Recommended Criteria		Additional Toxicity Information				Human Health Protection (30-day Average) *1 = carcinogen	Marine Aquatic Life Protection				
Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other	6-month Median		30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum	
Oxygen, dissolved												
pH			6.5 to 8.5 units								6.0 to 9.0 units	
Phosphorus			0.1 (50)									
Radioactivity, Gross Alpha											15 pCi/l (12)	
Radioactivity, Gross Beta											50 pCi/l	
Radium 226 + 228											5 pCi/l	
Selenium	71	300					16		60		150	
Settleable solids								1000	1500		3000	
Silver	0.92 (13)	2.3					0.7		2.8		7	
Sodium												
Strontium-90											8 pCi/l	
Sulfate												
Total dissolved solids (TDS)												
Thallium				2130			14				20,000 pCi/l	
Tritium												
Turbidity								75 NTU	100 NTU		225 NTU	
Uranium											20 pCi/l	
Zinc	86	95					20		80		200	

Table C-1 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

WATER QUALITY CRITERIA

ENDNOTES FOR TABLE C-1 - INORGANICS

(17-day)	For exposure of 7 days or less.	(21)	Reference 19 unless noted otherwise.
(10-day)	For exposure of 10 days or less.	(22)	See Reference 19.
(24-hr)	For exposure of 24 hours or less.	(23)	For white phosphorus.
(7-yr)	For "longer-term" exposure (7 years or less, EPA).	(24)	Guidance level (Reference 3) assumes relative source contribution of 10% from drinking water.
(A)	Known human carcinogen; sufficient epidemiologic evidence in humans.	(25)	For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
(B)	Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.	(26)	Varies with pH and temperature.
(C)	Possible human carcinogen; limited evidence from animal studies; no human data.	(27)	For the trivalent form.
(D)	Not classified as to human carcinogenicity; no data or inadequate evidence.	(28)	Value based on hardness of 40 mg/l; value increases with increasing hardness.
(E)	Evidence of non-carcinogenicity for humans.	(29)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.7852[\ln(\text{hardness})] - 3.490)$ µg/l.
		(30)	For dissolved chloride associated with sodium; criterion probably will not be adequately protective when chloride is associated with potassium, calcium, or magnesium, rather than sodium.
(1)	Or as noted in the California Ocean Plan (Reference 28)	(31)	For total residual chlorine.
(2)	Expressed as nitrogen.	(32)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8190[\ln(\text{hardness})] + 1.581)$ µg/l.
(3)	For total chlorine residual; for intermittent chlorine sources see Reference 26, Chapter IV, Table B.	(33)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8545[\ln(\text{hardness})] - 1.465)$ µg/l.
(4)	Value developed for chromium VI; may be applied to total chromium if valence unknown.	(34)	For hardness in mg/l as CaCO ₃ , criterion = $e(1.273[\ln(\text{hardness})] - 4.705)$ µg/l.
(5)	MCL varies with air temperature; 2.4 mg/l (S 53.7 °F); 2.2 mg/l (53.9 - 59.3 °F); 2.0 mg/l (59.4 - 63.8 °F); 1.8 mg/l (63.9 - 70.6 °F); 1.6 mg/l (70.0 - 79.2 °F); 1.4 mg/l (79.3 - 90.5 °F).	(35)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8460[\ln(\text{hardness})] + 1.1645)$ µg/l.
(6)	As NO ₃ .	(36)	For hardness in mg/l as CaCO ₃ , criterion = $e(1.128[\ln(\text{hardness})] - 3.828)$ µg/l.
(7)	Recommended level; Upper level = 500 mg/l; Short-term level = 600 mg/l.	(37)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8190[\ln(\text{hardness})] + 3.688)$ µg/l.
(8)	Effective 17 January 1994.	(38)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.9422[\ln(\text{hardness})] - 1.464)$ µg/l.
(9)	MCL includes this "Action level", to be exceeded in no more than 10 percent of samples.	(39)	For hardness in mg/l as CaCO ₃ , criterion = $e(1.273[\ln(\text{hardness})] - 1.480)$ µg/l.
(10)	As nitrogen; in addition, MCL for total nitrate and nitrite = 10,000 µg/l (as N).	(40)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8460[\ln(\text{hardness})] + 3.3612)$ µg/l.
(11)	Recommended level; Upper level = 1000; Short-term level = 1500 mg/l.	(41)	For the pentavalent form.
(12)	Includes Radium 226 but excludes Radon and Uranium.	(42)	Toxicity to algae occurs.
(13)	Proposed.	(43)	Based on reproductive toxicity.
(14)	Draft / tentative / provisional.	(44)	For hardness in mg/l as CaCO ₃ , criterion = $e(1.72[\ln(\text{hardness})] - 6.52)$ µg/l.
(15)	Calculated for child / for adult	(45)	For hardness in mg/l as CaCO ₃ , criterion = $e(0.8473[\ln(\text{hardness})] + 0.8604)$ µg/l.
(16)	Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.	(46)	Toxicity to one species of fish after 2800 hours of exposure.
(17)	Assumes 70 kg body weight and 2 liters/day water consumption.	(47)	Unionized ammonia concentrations
(18)	Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division 2).	(48)	For sum of chlorine-produced oxidants.
(19)	Regulatory dose level divided by 2 liters per day average consumption; represents a 1-in-100,000 incremental cancer risk estimate unless otherwise noted.	(49)	EC50 for eastern oyster embryos.
(20)	Based on reproductive toxicity	(50)	For elemental phosphorus; marine or estuarine.

Table C-1
WATER QUALITY CRITERIA

Numerical Values for Table 3-4 valid as of September 8, 1994
Page C-11

September 8, 1994

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)						California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk			
	Ocean Waters (1) *1 = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services		US Environmental Protection Agency		Toxicity	Taste & Odor		US EPA	National Academy of Sciences (NAS)					
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL										
															Primary MCL	Secondary MCL	Primary MCL	Secondary MCL
Acenaphthylene	0.0088 ± (2)													1 / 4 (7-yr, 13, 14)				
Acenaphthylene	220														0.3 (10-day, 14)			
Acenaphthylene	0.10 ±																	
Acrylonitrile	0.000022 ±																	
Aldrin	0.0088 ± (2)																	
Anthraxene			3			3		3	3 (11)									
Atrazine			18			18		18	18 (11)									
Benzene	0.0088 ± (2)																	
Benzene	5.5 ±		1			0.1 (11)	5	zero	0.35 (11)						200 (10-day)			
Benzene	0.000069 ±																	
Benzobifluoranthene	0.0088 ± (2)																	
Benzobifluoranthene	0.0088 ± (2)																	
Benzofluoranthene	0.0088 ± (2)																	
Benzol, biphenylene	0.0088 ± (2)																	
Benzotriptyrene	0.0088 ± (2)																	
alpha-BHC	0.008 (3)															500 (7-day, 3)		
beta-BHC	0.008 (3)															500 (7-day, 3)		
Gamma-BHC (Lindane)	0.008 (3)															500 (7-day, 3)		
delta-BHC	0.008 (3)															500 (7-day, 3)		
Technical-BHC	0.008 (3)															500 (7-day, 3)		
Bis(2-chloroethoxy) methane	4.4															500 (7-day)		
Bis(2-chloroethyl) ether	0.045 ±																	
Bis(2-chloropropyl) ether	1200																	
Bromodichloromethane	130 ± (4)		100 (10)			100 (10)										400 / 1300 (7-yr, 13, 14)		
Bromodichloromethane	130 ± (4)		100 (10)			100 (10)										2000 (10-day)		
Bromomethane	130 ± (4)		18			40		40	18 (11)							40		
Carbon tetrachloride	0.90 ±		0.5			5		zero	0.5 (11)							200 (7-day)		
Catechol	30 (6)															2200 (24 hr)		
Chlorobenzene	0.00023 ± (6)		0.1			2		zero	0.03 (11)									
Chlorobenzene	670		30			100		100	30 (11)									
4-Chloro-m-cresol	1 (7)																	
4-Chloro-o-cresol	1 (7)																	
8-Chloro-m-cresol	1 (7)																	
Chloroform	130 ±		100 (10)			100 (10)										4000 (10-day)		
Chloromethane	130 ± (4)															40 (14)		
Chloromethane	1 (7)																	
2-Chlorophenol	1 (7)																	
3-Chlorophenol	1 (7)																	
4-Chlorophenol	1 (7)																	
Chrysene	0.0088 ± (2)																	
2,4-D			100			0.2 (11)		zero (11)								70		
2,4-D			0.2			0.2		zero	0.002 (11)							80 (10-day)		
DDEP																		
DDO	0.00017 ± (6)																	
DDO	0.00017 ± (6)																	
DDO	0.00017 ± (6)																	
DDT	0.0088 ± (2)																	
Dibenz(a,h)anthracene	130 ± (4)		100 (10)			0.3 (11)		zero (11)								60 (14)		
Dibromochloromethane	3500															18,000 (24-hr)		
Dibutyl phthalate	5100 (9)															770		
1,2-Dichlorobenzene	5100 (9)															300 (115)		
1,3-Dichlorobenzene	5100 (9)																	

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	B A S I N P L A N				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)						California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) -†- = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services			US Environmental Protection Agency				Toxicity	Taste & Odor		US EPA	National Academy of Sciences (NAS)
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL G.U.I.							
1,4-Dichlorobenzene	18 ±		5		5	75	5 (11)	75	5 (11)			75	94 (15)			
3,3'-Dichlorobenzidine	0.008 ±		5		5				5 (11)							
1,1-Dichloroethane			5		0.5				0.3 (11)							
1,2-Dichloroethane	130 ±		0.5		6	5		zero	6 (11)			700 (10-day)				
1,1-Dichloroethylene	7100		6		6	7		7	6 (11)			7	100			
cis-1,2-Dichloroethylene			6		6	70		70	6 (11)			70				
trans-1,2-Dichloroethylene			10		10	100		100	10 (11)			100				
Dichloromethane	450 ±					5 (12)		zero (12)			40	2000 (10-day)	5000 (7-day)			
2,3-Dichlorophenol	1 (7)															
2,4-Dichlorophenol	1 (7)															
2,5-Dichlorophenol	1 (7)															
2,6-Dichlorophenol	1 (7)															
3,4-Dichlorophenol	1 (7)															
1,2-Dichloropropane			5		5	5		zero	5 (11)			90 (10-day)				
1,3-Dichloropropane	8.9 ±		0.5		0.5				0.2 (11)			30 (10-day)				
Dieldrin	0.000040 ±					8 (12)		zero (12)	4 (11)	0.05 (LOO)		5000	4200			
DDE (2,2-bis(4-chlorophenyl)propane)	3.5 ±		4		4			5000 (11)			400					
Diethyl phthalate	33,000															
2,4-Dimethylphenol	30 (5)															
Dimethyl phthalate	820,000															
4,6-Dinitro-o-cresol	30 (5)															
Dinitrophenol																
2,4-Dinitrophenol	4															
2,4-Dinitrochlorobenzene	2.6 ±															
1,2-Diphenylhydrazine	0.15 ±															
Endosulfan	9 (16)															
Endosulfan sulfate	9 (16)															
Endrin	0.002		0.2		0.2	2 (12) / 0.2		2 (12)				2				
Ethylbenzene	4100		880		880	700	30 (11)	700	880 (11)			700				
Ethylene dibromide (EDB)			0.02		0.02	0.05		zero	0.01 (11)			8 (10-day)				
Fluoranthene	15															
Fluorene	0.0088 ± (2)															
Glyphosate			700		700	700 (12)		700 (12)	700 (11)			700				
Heptachlor	0.00072 ± (17)		0.01		0.01	0.4		zero	0.01 (11)			10 (10-day)				
Heptachlor epoxide	0.00072 ± (17)		0.01		0.01	0.2		zero	0.007 (11)			0.1 (7-yr)				
Hexachlorobenzene	0.00021 ±					1 (12)		zero (12)				50 (10-day)	30 (7-day)			
Hexachlorobutadiene	14 ±											1				
Hexachlorocyclopentadiene	58					50 (12)		50 (12)				1				
Hexachlorocyclopentadiene	2.5 ±															
Indeno(1,2,3-c)pyrene	0.0088 ± (2)					0.4 (11)		zero (11)				100				
Isophorone	150,000															
Methanes, halo-	130 ± (4)					100 (10)		40				40	700			
Methoxychlor			100		100	40			20 (11)							
Molinate			20		20											
Nitrobenzene	4.9															
2-Nitrophenol	30 (5)												5 (7-day)			
Nitrophenol	30 (5)												290 (7-day, 19)			
4-Nitrophenol	30 (5)											60 (14)	290 (7-day, 19)			
N-Nitrosodimethylamine	7.3 ±															

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

Organic Constituent	BASIN PLAN				Drinking Water Standards (California & Federal) Maximum Contaminant Levels (MCLs)					California Recommended Public Health Level (RPHL) Department of Health Services	California State Action Levels Department of Health Services		Other Taste and Odor Thresholds	Health Advisories or Suggested No-Adverse-Response Levels (SNARLS) for toxicity other than cancer risk	
	Ocean Waters (1) -g- = carcinogen	Bays and Estuaries	Inland Surface Waters and Ground Waters		California Dept. of Health Services			US Environmental Protection Agency	Toxicity		Taste & Odor	US EPA		National Academy of Sciences (NAS)	
			Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal								
															Primary MCL
N-Nitrosodiphenylamine	2.5 ±														
trans-Nonachlor	0.00023 ± (6)														
Oil & grease	25,000														
Oxychordane	0.00023 ± (6)														
PAHs	0.0088 ± (2)														
Pentachlorophenol	1 (7)														
Phenanthrene	0.0088 ± (2)														
Phenol	30 (5)														
Phenols, chlorinated	1														
Phenols, nitro-	30 (5)														
Phenols, non-chlorinated	30														
Phthalate esters															
Phenanthrene	0.0088 ± (2)														
Phenazopyridine															
Phenazopyridine hydrochloride															
Phenacetin															
Phenobarbital															
Phenol	30 (5)														
Phenols, chlorinated	1														
Phenols, nitro-	30 (5)														
Phenols, non-chlorinated	30														
Phenoxylbenzamine															
Phenoxylbenzamine hydrochloride															
Phenyl glycidyl ether															
p-Phenylenes, sodium	0.000019 ±														
Polychlorinated biphenyls	0.0088 ± (2)														
Pyrene	30 (5)														
Resorcinol															
Simazine															
2,3,7,8-TCDD (Dioxin)	0.0000000039 ± (20)														
1,1,2,2-Tetrachloroethane	1200														
Tetrachloroethylene (PCE)	99 ±														
2,3,4,6-Tetrachlorophenol	1 (7)														
2,3,5,8-Tetrachlorophenol	1 (7)														
Thiobencarb															
Toluene	85,000														
Toxaphene	0.00021 ±														
2,4,5-TP (Silvex)															

Values are in *millions* unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

TABLE C-2 -- VALUES ARE IN PPM

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water					US EPA National Ambient Water Quality Criteria									
	US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	Cancer Risk Estimates for Drinking Water				California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (26)	Health and Welfare Protection			Freshwater Aquatic Life Protection				
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (24)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNARL	National Academy of Sciences (NAS) Drinking Water and Health			Non-Cancer Public Health Effects	One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)		
Acenaphthylene															
Acenaphthylene		0.035	0.07	(D)	0.36	0.35		320 / 780 (29)	0.059 / 0.66 (29)						
Acrylonitrile		0.0021	0.002	0.002 (B2,14)	0.003	0.02		9000 / 110,000 (29)	0.00013 / 0.00014 (29)						
Albin	2100			(D)											
Anthracene	3.5		0.14	(D)				25 (30)							
Azinphos	18			(D)											
Benflazone		0.35	1	1.0 (A)		3.5			0.0028 / 0.031 (32)						
Benzo(a)anthracene		0.00007		(B2)		0.0005			1.2 / 71 (29)						
Benzo(b)fluoranthene				(B2)					0.00012 / 0.00014 (29)						
Benzo(k)fluoranthene				(B2)					0.0028 / 0.031 (32)						
Benzo(a)pyrene		0.0029	0.003	(B2)		0.03			0.0028 / 0.031 (32)						
Benzo(a)pyrene					0.33	0.15			0.0039 / 0.013 (29)						
Benzo(a)pyrene					0.12	0.25			0.014 / 0.046 (29)						
Benzo(a)pyrene					0.054	0.3			0.019 / 0.063 (29)						
Benzo(a)pyrene	0.2	0.032		0.03 (C)					0.0123						0.06
Benzo(a)pyrene															
Benzo(a)pyrene		0.0088				0.1									
Benzo(a)pyrene		0.014			0.42	0.15		1400 / 170,000 (29)	0.031 / 1.4 (29)						
Benzo(a)pyrene	280			(D)					0.27 / 2.2 (29)						
Benzo(a)pyrene		0.27	1.4	0.6 (B2,14)		2.5			4.3 / 360 (29)						
Benzo(a)pyrene			4	4 (B2,14)				48 / 4000 (29)							
Benzo(a)pyrene	7			(D)											
Benzo(a)pyrene	35			(E)											
Benzo(a)pyrene		0.23	0.3	0.3 (B2)	4.5	2.5			0.25 / 4.4 (29)						
Benzo(a)pyrene															
Benzo(a)pyrene		0.029 / 0.027	0.03	0.03 (B2)	0.028	0.25		880 / 21,000 (29)	0.00057 / 0.00059 (29)						0.0043
Benzo(a)pyrene	140			(B2)	2.3 (25)					20					
Benzo(a)pyrene										3000					
Benzo(a)pyrene										1800					
Benzo(a)pyrene		1.1 / 0.43	6	6.0 (B2,14)	0.26 / 8.6 (26)	10			8.7 / 470 (29)						
Benzo(a)pyrene	2.8			(C)											
Benzo(a)pyrene	35			(D)						0.1					
Benzo(a)pyrene										0.1					
Benzo(a)pyrene															
Benzo(a)pyrene				(B2)					0.0028 / 0.31 (32)						
Benzo(a)pyrene	70			(D)				100							
Benzo(a)pyrene		0.006	0.03	0.03 (B2)	0.051	0.05			0.025						
Benzo(a)pyrene	DDO	0.15				1 (B)			0.00083 / 0.00084 (29)						
Benzo(a)pyrene		0.1				1 (B)			0.00059 / 0.00059 (29)						
Benzo(a)pyrene		0.1	0.1	(B2)	0.042	1 (B)			0.00059 / 0.00059 (29)						0.0010
Benzo(a)pyrene				(B2)		0.1			0.0028 / 0.31 (32)						
Benzo(a)pyrene				(C)		3.5			0.41 / 34 (29)						
Benzo(a)pyrene	14			(D)	0.6			2700 / 12,000 (29)							
Benzo(a)pyrene	700			(D)				2700 / 17,000 (29)							
Benzo(a)pyrene	820			(D)				400 / 2600 (31)							
Benzo(a)pyrene				(D)											

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

WATER QUALITY CRITERIA

Page C-15

September 8, 1994

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Integrated Risk Information System (IRIS) Reference Dose as a Water Quality Criterion (23)	One-in-a-Million Incremental Cancer Risk Estimates for Drinking Water					California Proposition 65 Regulatory Level as a Water Quality Criterion	Agricultural Water Quality Goals (28)	US EPA National Ambient Water Quality Criteria				
		Health and Welfare Protection							Freshwater Aquatic Life Protection				
		Cal/EPA Cancer Potency Factor as a Water Quality Criterion (24)	US EPA Integrated Risk Information System (IRIS)	US EPA Health Advisory or SNAARL	National Academy of Sciences (NAS) Drinking Water and Health	Non-Cancer Public Health Effects			One-in-a-Million Incremental Cancer Risk Estimate	Taste and Odor or Welfare	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (1-hour Average)
1,4-Dichlorobenzene	70	0.88		(C)		10		400 / 2600 (31)					
3,3'-Dichlorobenzidine		0.029				0.3			0.04 / 0.077 (29)				
1,1-Dichloroethane						50							
1,2-Dichloroethane		0.5	0.4	0.4 (B2)	0.71	5			0.38 / 99 (29)				
cis-1,2-Dichloroethylene	6.3		0.06	0.06 (C)					0.057 / 3.2 (29)				
trans-1,2-Dichloroethylene	70			(D)									
Dichloromethane	140			(D)									
2,3-Dichlorophenol		2.5	5	5 (B2)		25			4.7 / 1600 (29)				
2,4-Dichlorophenol								93 / 790 (29)		0.04			
2,5-Dichlorophenol	21			(D)						0.3			
2,6-Dichlorophenol										0.5			
3,4-Dichlorophenol										0.2			
1,2-Dichloropropane		0.56	0.5	0.5 (B2)						0.3			
1,3-Dichloropropane		0.19	0.2	0.2 (B2)	0.45								
Di(2-ethylhexyl)phthalate		0.0022	0.002	0.002 (B2)	0.0019	0.02		10 / 1700 (29)	0.00014 / 0.00014 (29)			0.0019	
Diethyl phthalate	5600	4.2	3	3 (B2)	2.4	40		23,000 / 120,000 (29)	1.8 / 5.9 (29)			360 (11)	400 (11)
2,4-Dimethylphenol	140			(D)						400			
Dimethyl phthalate								313,000 / 2,900,000 (29)					
4,6-Dinitro-o-cresol								13.4 / 785 (29)					
Dinitrophenol								70					
2,4-Dinitrophenol								70 / 14,000 (29)					
2,4-Dinitrotoluene		0.11	50	0.05 (B2)		1			0.11 / 9.1 (29)				
1,2-Diphenylhydrazine						0.4			0.040 / 0.54 (29)			0.056	
Endosulfan								0.93 / 2.0 (29)				0.056 (35)	
Endosulfan sulfate								0.93 / 2.0 (29)				0.0023	
Endrin	2.1			(D)				0.78 / 0.81 (33,29)					
Ethylbenzene	700		0.0004	0.0004 (B2)	0.065	0.1		3100 / 29,000 (29)					
Ethylene dibromide (EDB)		0.0097											
Fluoranthene				(D)				300 / 370 (29)					
Fluorene	280			(D)				1300 / 14,000 (29)					
Glyphosate	700			(D)									
Heptachlor		0.0061 / 0.0078	0.008	0.008 (B2)	0.012	0.1		0.00021 / 0.00021 (29)				0.0038	
Heptachlor epoxide		0.0027 / 0.0038	0.004	0.004 (B2)		0.04		0.00010 / 0.00011 (29)				0.0038	
Hexachlorobenzene		0.019		0.02 (B2)	0.017	0.2		0.00075 / 0.00077 (29)			3.68 (11)		6 (11)
Hexachlorobutadiene	1.4			(C)				0.44 / 50 (29)					
Hexachlorocyclopentadiene	49			(D)				240 / 17,000 (29)		1			
Hexachlorocyclopentadiene				(C)		10			1.9 / 8.9 (29)				
Indene[1,2,3-c]pyrene				(B2)					0.0028 / 0.031 (32,28)				
Isophorone	140			40 (C)					8.4 / 600 (29)				
Methanes, halo-													
Methoxychlor	35			(D)				100					
Molinate	14												
Nitrobenzene								17 / 1900 (29)		30			
2-Nitrophenol													
Nitrophenol													
4-Nitrophenol				(D)									
N-Nitrosodimethylaniline		0.0022				0.02			0.00069 / 8.1 (29)				

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.
WATER QUALITY CRITERIA

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Table C.2 -- Values are in $\mu\text{S}/\text{m}$ unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Ambient Water Quality Criteria (cont.)			California Ocean Plan										US EPA National Ambient Water Quality Criteria				
	Freshwater Aquatic Life Protection (cont.)			Numerical Water Quality Objectives										Saltwater Aquatic Life Protection				
	Recommended Criteria (cont.)			Marine Aquatic Life Protection										Recommended Criteria				
	Maximum (Instantaneous)	Additional Toxicity Information		Human Health Protection (30-day Average)	6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (11-hour Average)	Maximum (Instantaneous)	Additional Toxicity Information				
		Acute	Chronic	*† = carcinogen										Acute	Chronic	Other		
Acephenanthrene	68	21		0.0088 ± (2)										300 (32)				
Acenaphthylene	7550			0.10 ±										55				
Acrylonitrile	3			0.00022 ±														
Adrin				0.0088 ± (2)										300 (32)				
Anthracene	1.0 (30)																	
Atrazine				0.0088 ± (2)														
Ben(a)anthracene	5300			5.9 ±														
Ben(a)pyrene	2500			0.00049 ±														
Ben(b)fluoranthene				0.0088 ± (2)														
Ben(b)fluoranthene				0.0088 ± (2)														
Ben(c)fluoranthene				0.0088 ± (2)														
Ben(e)pyrene				0.0088 ± (2)														
Benzo(a)pyrene				0.0088 ± (2)														
Beta-BHC	2.0																	
Gamma-BHC (Lindane)																		
delta-BHC																		
Technical-BHC	100			4.4														
Bis(2-chloroethyl) methane	238,000 (38)	122 (43)		0.045 ±														
Bis(2-chloroethyl) ether	238,000 (38)	122 (43)		1200														
Bis(2-chloropropyl) ether	11,000 (40)			130 ± (4)														
Bromodichloromethane	11,000 (40)			130 ± (4)														
Bromoforn	11,000 (40)			130 ± (4)														
Bromomethane	35,200			0.80 ±														
Carbon tetrachloride																		
Catechol	2.4			0.00023 ± (8)														
Chlordane	250 (41)			370														
Chlorobenzene	30																	
4-Chloro-m-cresol																		
4-Chloro-o-cresol																		
6-Chloro-m-cresol																		
Chloroform	25,800	1240		130 ±														
Chloromethane	11,000 (40)			130 ± (4)														
2-Chlorophenol	4380																	
3-Chlorophenol																		
4-Chlorophenol																		
Chrysene	2.4-0			0.0088 ± (2)														
DDCP																		
DDD	0.6			0.00017 ± (8)														
DDE	1050			0.00017 ± (8)														
DOT				0.00017 ± (8)														
Dibenz(a,h)anthracene	11,000 (40)			130 ± (4)														
Dibromodichloromethane	840 (42)	3 (42)		3500														
Dibutyl phthalate	1120 (31)	783 (31)		5100 (8)														
1,2-Dichlorobenzene	1120 (31)	783 (31)		5100 (8)														
1,3-Dichlorobenzene																		

Table C-2 -- Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

WATER QUALITY CRITERIA

Page C-18

September 8, 1994

Table C-2 WATER QUALITY CRITERIA - ORGANIC CONSTITUENTS

Organic Constituent	US EPA Ambient Water Quality Criteria (cont.)			California Ocean Plan						US EPA National Ambient Water Quality Criteria												
	Freshwater Aquatic Life Protection (cont.)			Numerical Water Quality Objectives						Saltwater Aquatic Life Protection												
	Recommended Criteria (cont.)			Marine Aquatic Life Protection						Recommended Criteria												
	Additional Toxicity Information			Human Health Protection (30-day Average)						Continuous Concentration (4-day Average)												
	Maximum (Instantaneous)	Acute	Chronic	Other	* : = carcinogen						6-month Median	30-day Average	7-day Average	Daily Maximum	Instantaneous Maximum	Continuous Concentration (4-day Average)	24-hour Average	Maximum Concentration (11-hour Average)	Maximum (Instantaneous)	Acute	Chronic	Other
N-Nitrosodiphenylamine	5850 (55)				2.5 :															3,300,000 (55)		
trans-Nonachlor					0.000023 :																	
Oil & Grease					0.000023 :																	
Drychlorodene					0.0008 :																	
PAHs					1.74 (57)																	
Pentachlorophenol					0.0008 :																	
Phenanthrene					0.0008 :																	
Phenol					0.0008 :																	
Phenols, chlorinated					0.0008 :																	
Phenols, nitro-					0.0008 :																	
Phenols, non-chlorinated					0.0008 :																	
Phthalate esters					0.0008 :																	
Phthalene					0.0008 :																	
Phthalonitrile					0.0008 :																	
Phenazopyridine hydrochloride					0.0008 :																	
Phenacetin					0.0008 :																	
Phenobarbital					0.0008 :																	
Phenol					0.0008 :																	
Phenols, chlorinated					0.0008 :																	
Phenols, nitro-					0.0008 :																	
Phenols, non-chlorinated					0.0008 :																	
Phenylbenzamine					0.0008 :																	
Phenylbenzamine hydrochloride					0.0008 :																	
Phenyl glycidyl ether					0.0008 :																	
o-Phenylphenate, sodium					0.0008 :																	
Polychlorinated biphenyls					0.0008 :																	
Pyrene					0.0008 :																	
Resorcinol					0.0008 :																	
Simazine					0.0008 :																	
2,3,7,8-TCDD (Dioxin)					0.0008 :																	
1,1,2,2-Tetrachloroethane					0.0008 :																	
Tetrachloroethylene (PCE)					0.0008 :																	
2,3,4,6-Tetrachlorophenol					0.0008 :																	
2,3,5,6-Tetrachlorophenol					0.0008 :																	
Thiobenzene					0.0008 :																	
Toluene					0.0008 :																	
Toxaphene					0.0008 :																	
2,4,5-TP (Silvex)					0.0008 :																	
Tributyltin					0.0008 :																	
1,1,1-Trichloroethane					0.0008 :																	
1,1,2-Trichloroethane					0.0008 :																	
Trichloroethylene (TCE)					0.0008 :																	
Trichlorofluoromethane					0.0008 :																	
2,4,5-Trichlorophenol					0.0008 :																	
2,4,6-Trichlorophenol					0.0008 :																	
1,1,2-Trichloro-1,2,2-trifluoroethane					0.0008 :																	
Tindropend					0.0008 :																	
Vinyl chloride					0.0008 :																	
Xylenes					0.0008 :																	

Table C-2 ... Values are in µg/l (ppb) unless otherwise indicated. Numbers in parentheses indicate endnotes following the tables.

WATER QUALITY CRITERIA

Page C-20

September 8, 1994

ENDNOTES FOR TABLE C-2 ORGANICS

- (17-day) For exposure of 7 days or less.
 (10-day) For exposure of 10 days or less.
 (24-hr) For exposure of 24 hours or less.
 (7-yr) For "longer-term" exposure (7 years or less, EPA).
- (A) Known human carcinogen; sufficient epidemiologic evidence in humans.
 (B1) Probable human carcinogen; limited epidemiologic evidence in humans
 (B2) Probable human carcinogen; sufficient evidence from animal studies; no or inadequate human data.
 (C) Possible human carcinogen; limited evidence from animal studies; no human data.
 (D) Not classified as to human carcinogenicity; no data or inadequate evidence.
 (E) Evidence of non-carcinogenicity for humans.
- (1) For hardness in mg/l as CaCO₃, criterion = $e(0.8473[\ln(\text{hardness})] + 0.8604)$ µg/l.
 (2) For sum of acenaphthylene, anthracene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzol(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, indeno(1,2,3-c,d)pyrene, phenanthrene, and pyrene. For hardness in mg/l as CaCO₃, criterion = $e(1.273[\ln(\text{hardness})] - 1.460)$ µg/l.
 (3) For hardness in mg/l as CaCO₃, criterion = $e(0.8473[\ln(\text{hardness})] + 0.8604)$ µg/l.
 (4) For sum of bromoform, bromomethane, chloromethane, dibromochloromethane, and bromodichloromethane.
 (5) For sum of nonchlorinated phenolic compounds.
 (6) For the sum of oxychlorane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
 (7) For sum of chlorinated phenolic compounds.
 (8) Instantaneous maximum.
 (9) For sum of 1,2- and 1,3-dichlorobenzenes.
 (10) From Reference 30.
 (11) Proposed.
 (12) Effective 17 January 1994.
 (13) For hardness in mg/l as CaCO₃, criterion = $e(0.8473[\ln(\text{hardness})] + 0.7614)$ µg/l.
 (14) MCL varies with air temperature; 2.4 mg/l [53.7 °F; 2.2 mg/l [53.8 - 58.3 °F; 2.0 mg/l [58.4 - 63.8 °F; 1.8 mg/l [63.9 - 70.8 °F; 1.6 mg/l [70.9 - 79.2 °F; 1.4 mg/l [79.3 - 90.5 °F].
 (15) Based on organoleptic considerations (taste, odor, color, laundry staining, etc.)
 (16) For hardness in mg/l as CaCO₃, criterion = $e(1.273[\ln(\text{hardness})] - 4.705)$ µg/l.
 (17) As CaCO₃; minimum concentration except where natural concentrations are less.
 (18) Toxicity to algae occurs.
 (19) For hardness in mg/l as CaCO₃, criterion = $e(0.8190[\ln(\text{hardness})] + 1.561)$ µg/l.
 (20) For "TCDD equivalents" calculated as the sum of 2,3,7,8-chlorinated dibenzodioxin and dibenzofuran concentrations multiplied by their respective U.S. EPA Toxicity Equivalency Factors.
 (21) Expressed as decachlorobiphenyl.
 (22) For hardness in mg/l as CaCO₃, criterion = $e(0.8190[\ln(\text{hardness})] + 3.888)$ µg/l.
 (23) Assumes 70 kg body weight, 2 liters/day water consumption, and 20% relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.
 (24) Assumes 70 kg body weight and 2 liters/day water consumption.
 (25) For sum of dichloropropanes.
 (26) Draft / tentative / provisional.
 (27) For sum of halomethanes.
 (28) Reference 19 unless noted otherwise.
 (29) For the sum of oxychlorane and alpha and gamma isomers of chlordane, chlordene and nonachlor.
 (30) For hardness in mg/l as CaCO₃, criterion = $e(0.7852[\ln(\text{hardness})] - 3.490)$ µg/l.
 (31) For hardness in mg/l as CaCO₃, criterion = $e(1.128[\ln(\text{hardness})] - 3.828)$ µg/l.

Table C-2
WATER QUALITY CRITERIA

Numerical Values for Table 3-5 valid as of September 8, 1994
 Page C-21

- (32) For hardness in mg/l as CaCO₃, criterion = $e(0.9422[\ln(\text{hardness})] - 1.464)$ µg/l.
 (33) For sum of dichlorobenzenes.
 (34) For total trihalomethanes (sum of bromoform, bromodichloromethane, chloroform and dibromochloromethane); based largely on technology and economics.
 (35) Based on endosulfan; U.S. EPA Water Quality Advisory (Reference 13).
 (36) Determined not to pose a risk of cancer through ingestion (Title 22, CCR, Division Includes Radium 226 but excludes Radon and Uranium.
 (37) Pentavalent arsenic (As(V)) effects on plants.
 (38) Recommended level; Upper level = 500 mg/l; Short-term level = 800 mg/l.
 (39) For sum of dichloroethylenes.
 (40) For sum of dichloropropanes.
 (41) As NO₃.
 (42) Effective 17 January 1994.
 (43) Toxicity to a fish species exposed for 7.5 days.
 (44) Adverse behavioral effects occur to one species.
 (45) For hardness in mg/l as CaCO₃, criterion = $e(1.72[\ln(\text{hardness})] - 6.52)$ µg/l.
 (46) Adverse effects on a fish species exposed for 168 days.
 (47) A decrease in the number of algal cells occurs.
 (48) Guidance level (Reference 3) assumes relative source contribution of 10% from drinking water.
 (49) For chlorinated systems.
 (50) For white phosphorus.
 (51) For sum of carcinogenic polynuclear aromatic hydrocarbons.
 (52) For sum of nitrophenols.
 (53) For hardness in mg/l as CaCO₃, criterion = $e(0.8480[\ln(\text{hardness})] + 3.3812)$ µg/l.
 (54) For total chlorine residual; for intermittent chlorine sources see Reference 26.
 (55) For consumption of water and aquatic organisms / for consumption of aquatic organisms only.
 (56) MCL includes this "Action level", to be exceeded in no more than 10 percent of samples.
 (57) For sum of nonchlorinated phenolic compounds.
 (58) Recommended level; Upper level = 1000; Short-term level = 1500 mg/l.
 (59) For sum of tetrachloroethanes.
 (60) Calculated from corn oil gavage animal study / from drinking water animal study.
 (61)

September 8, 1994

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- References 3, 4, 11, 12, and 13.
16. U. S. Environmental Protection Agency, "Quality Criteria for Water, 1986" (May 1986) plus updates (various dates).
 17. U. S. Environmental Protection Agency, Federal Register, Vol. 49, No. 194 (Wednesday, 15 February 1984) (TCDD cancer risk level).
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Appendix D

Existing Water Reclamation for Leucadia County Water District, Vallecitos Water District

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

2771 CLAIREMONT MESA BOULEVARD, SUITE B
DIEGO, CA 92124-1331
PHONE: (619) 467-2952



March 19, 1993

Ms. Joan Geiselhart
General Manager
Leucadia County Water District
P.O. Box 2397
Leucadia, CA 92024-0954

Dear Ms. Geiselhart:

Re: Certification Report For Forest R. Gafner Water Reclamation
Plant - Order No. 87-82

Regional Board staff has reviewed the Certification Report submitted by Engineering-Science, Inc. for the Forest R. Gafner Water Reclamation Plant in accordance with Reporting Requirement D.12 of Order No. 87-82 and Provision C.21 of Addendum No. 1 to Order No. 87-82. Based upon the review of the report, Regional Board staff has determined that the Forest R. Gafner Water Reclamation Plant complies with Reporting Requirement D.12 of Order No. 87-82 and Provision C.21 of Addendum No. 1 to Order No. 87-82.

If you have any questions, please contact Mr. Ken Nhieu of my staff at (619) 467-2970.

Very truly yours,

Robert Marnix

for Arthur L. Coe
Executive Officer

KDN

cc: Mr. Dan Duprey, Project Manager
Engineering-Science, INC.

file: Leucadia Co. Water Dist., Forest R. Gafner WRP (01-
0206.02)

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

ORDER NO. 93-41

**WASTE DISCHARGE REQUIREMENTS
FOR
LEUCADIA COUNTY WATER DISTRICT
FOREST R. GAFNER WATER RECLAMATION PLANT
SAN DIEGO COUNTY**

The California Regional Water Quality Board, San Diego Region (hereinafter Regional Board), finds that:

1. On May 21, 1979, this Regional Board adopted Order No. 79-35, "Waste Discharge Requirements for Leucadia County Water District, Forest R. Gafner Water Reclamation Plant, San Diego County." Order No. 79-35 and addenda thereto established requirements for the disposal of treated domestic sewage to the La Costa Golf Course.
2. On May 4, 1987, this Regional Board adopted Order No. 87-82, "Waste Discharge Requirements for Leucadia County Water District, Forest R. Gafner Water Reclamation Plant, San Diego County." Order No. 87-82 rescinded Order No. 79-35 and established waste discharge requirements for the disposal of up to 0.75 million gallons per day (MGD) of treated wastewater from the Forest R. Gafner Water Reclamation Plant. Addendum No. 1 to Order No. 87-82 authorized the Leucadia County Water District to supply reclaimed water to the Carlsbad Municipal Water District from Forest R. Gafner Water Reclamation Plant for distribution anywhere within the City of Carlsbad where the ground water quality objectives either do not apply or are 3,500 milligrams per liter (mg/l) for the total dissolved solids (TDS).
3. As a part of the FY 1993/94 Waste Discharge Order Update Program, Order No. 87-82 has been reviewed by the Regional Board staff in accordance with criteria established in the Administrative Procedures Manual adopted by the State Water Resources Control Board. This Order, which supersedes Order No. 87-82, consolidates and makes changes to the Findings, Requirements, and Monitoring and Reporting Program of Order No. 87-82.
4. On May 20, 1991, this Regional Board adopted Order No. 91-60, "Water Reclamation Requirements for the purveyance of reclaimed water by the Carlsbad Municipal Water District, San Diego County." Order No. 91-60 authorizes the Carlsbad

- 4 -

Municipal Water District to purvey water from the Shadowridge WRP, the Meadowlark WRP, and the Gafner WRP to the portions of the City of Carlsbad.

5. The Forest R. Gafner Water Reclamation Plant (Forest R. Gafner WRP) is located at 1960 La Costa Avenue, which is immediately upstream of Batiquitos Lagoon, Sections 35 and 36, T12S, R4W, SBB&M.
6. The Leucadia County Water District (hereinafter discharger) reports that up to 0.75 MGD of treated effluent is currently discharging to the Encina Ocean Outfall. The discharge of effluent to the Encina Ocean Outfall is regulated by this Regional Board's National Pollutant Discharge Elimination System permit for the Encina Ocean Outfall.
7. The discharger reports that the proposed tertiary treatment facilities will be located within the existing plant site and will provide full Title 22 treatment for unrestricted use. The tertiary processes will consist of chemical addition and rapid mix, flocculation, clarification, filtration, and chlorination.
8. The discharger reports that all sludge from the primary and secondary clarifiers is pumped or flows by gravity to the Leucadia Pump Station where it becomes part of the wastewater flow which is pumped to the Encina Water Pollution Control Facility for secondary treatment and ocean discharge.
9. The discharger reports that the existing treatment facilities consist of an influent grinder, a primary clarifier, a trickling filter, a secondary clarifier, a chlorine contact tank, and a 800,000 gallons on-site effluent storage reservoir. In addition, a sludge digester is on site that is not currently being used.
10. The discharger reports that the headworks, primary clarifier, and trickling filter are covered with aluminum domes for odor control. Air from these processes and from the Leucadia Pump Station is transferred to a soil filter bed for odor removal treatment. Activated carbon air treatment facilities are provided as a back-up to the soil filter bed.
11. Order No. 87-82 prohibited the discharger from discharging treated wastewater to the La Costa Golf Course reservoirs from November 1 through March 30 because the reservoirs do not have 100-year 24-hour flood and runoff protection. However, because of the drought, the Executive Officer of this Regional Board issued a temporary waiver authorizing the discharge of treated wastewater to the reservoirs until

the end of March 1993. In addition, the discharger was required to submit a technical report addressing the impact to the surface water when an overflow occurs.

12. On August 19, 1991, Engineering-Science, Inc. submitted a technical report, on behalf of the District, to request a relaxation of the 100-year 24-hour flood protection for the reclaimed water storage reservoir located at the La Costa Golf Course. The report stated that flooding of the reservoir will not cause adverse water quality impacts because: 1) Flooding of the reservoir occurs infrequently, 2) Reclaimed water quality will be high, and 3) During flooding events, peak stream flows will dilute any reclaimed water discharge to the creek due to the flooding. The report, however, did not provide a quantification of the possible water quality changes to the receiving water during flood conditions. In order to substantiate that the intermittent overflow of reclaimed water will not impact surface water quality, this Order requires a periodic surface water monitoring and intense monitoring during any overflow. In addition, this Order requires the District to implement appropriate and reasonable measures to prevent discharge of reclaimed water from the reservoir to San Marcos Creek or Batiquitos Lagoon. The measure will include the termination of the discharge to the reservoir when there is potential for overflow.
13. The existing disposal areas are located in the Carlsbad (4.00) Hydrologic Unit (HU) and in the following Hydrologic Areas (HA) and Subareas (HSA):
 - a. Buena Vista Creek (4.20) HA, El Salto (4.21) HSA within the City of Carlsbad;
 - b. Agua Hedionda (4.30) HA, Los Monos (4.31) HSA within the City of Carlsbad;
 - c. Encinas (4.40) HA within the City of Carlsbad;
 - d. San Marcos (4.50) HA, Batiquitos (4.51) HSA within the City of Carlsbad; and
 - e. San Marcos (4.50) HA, Richland (4.52) HSA.
14. The "Comprehensive Water Quality Control Plan Report, San Diego Basin (9) (Basin Plan)", was adopted by this Regional Board on March 17, 1975 and subsequently approved by the State Water Resources Control Board (State Board). Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board.

15. The Basin Plan established the following beneficial uses of surface water and ground water in the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA:

Beneficial Uses Identified in Basin Plan											
Beneficial Use		Surface Water					Groundwater				
		4.21	4.31	4.40	4.51	4.52	4.21 ¹	4.31 ¹	4.40	4.51 ¹	4.52 ¹
MUN	Municipal and Domestic Supply		X				X	O		O ⁴	X ⁵
AGR	Agriculture Supply	X	X		X	X	O	X ² O ³		O ⁴	X ⁵
IND	Industrial Service Supply	X	X				O	O		O ⁴	X ⁵
PROC	Industrial Process Supply										
GWR	Groundwater Recharge										
FRSH	Freshwater Replenishment										
POW	Hydropower Generation										
REC-1	Water Contact Recreation	X	X		X	X					
REC-2	Non-Contact Water Recreation	X	X	X	X	X					
WARM	Warm Fresh-Water Habitat	X		X	X	X					
COLD	Cold Fresh-Water Habitat										
WILD	Wildlife Habitat	X	X	X	X	X					
RARE	Preservation of Rare & Endangered Species	X	X	X	X	X					

Notes: O Potential beneficial uses.
X Existing beneficial uses.

- 1 These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5. The beneficial uses for the remainder of the hydrologic area are as shown.
- 2 These beneficial uses designations apply to the portion of subarea 4.31 tributary to Agua Hedionda Creek downstream from the El Camino Real Crossing, except lands tributary to Marcario Canyon (located directly southerly of Evans Point), land directly south of Agua Hedionda Lagoon, and areas west of Interstate Highway 5.
- 3 These beneficial use designations apply to the portion of subarea 4.31 bounded on the west by the easterly boundary of the Interstate Highway 5 right-of-way; on the east by the easterly boundary of El Camino Real; and on the north by a line extending along the southerly edge of Agua Hedionda Lagoon to the easterly edge of the Agua Hedionda Lagoon, thence in an easterly direction to Evans Point, thence easterly to El Camino Real along the ridge lines separating Letterbox Canyon and the area draining to Marcario Canyon.
- 4 These beneficial use designations apply to the portion of subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate Highway 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- 5 The beneficial uses do not apply to hydrologic subarea 4.51 and hydrologic subarea 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and to Encinitas Creek. The beneficial uses for the remainder of the subarea are as shown.

16. The Basin Plan established the following water quality objectives for the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA:

Basin Plan Water Quality Objectives				
CONSTITUENT	Concentration not to be exceeded <u>more than 10 percent of the time</u> during any one year period (mg/l or as noted)			
	Inland Surface Water	Groundwater		
	4.21, 4.31, 4.40, 4.51, 4.52	4.21 ¹ , 4.31 ^{1,2} , 4.40 ¹ , 4.51 ^{1,3,4}	4.31 ¹	4.52 ^{1,3}
Total Dissolved Solids	500	3500 _s	1200	1000
Chloride	250	800 _s	500	400
Percent Sodium	60 %	60 %	60 %	60 %
Sulfate	250	500 _s	500	500
Nitrate (as NO ₃)	—	45 _s	10	10
Nitrogen and Phosphorus	—	—	—	—
Iron	0.3	0.3 _s	0.3	0.3
Manganese	0.05	0.05 _s	0.05	0.05
Methylene Blue Active Substances	0.5	0.5	0.5	0.5
Boron	0.5	2.0 _s	2.0	0.5
Odor	None	None	None	None
Turbidity	20 NTU	5 NTU	75 NTU	5 NTU
Color	20 Units	15 Units	15 Units	15 Units
Fluoride	1.0	1.0	1.0	1.0

Note: mg/l = milligrams per liter

NTU = Nephelometric turbidity units

- Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any reservoir or lake, nor 0.025 mg/l in any reservoir or lake. A desired goal in flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds, however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 shall be used.

- The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the hydrologic area (subarea) are as shown.
- The water quality objectives apply to the portion of Subarea 4.31 bounded on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5, the hydrologic subarea 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and Encinitas Creek. The objectives for the remainder of the hydrologic area (subarea) are as shown. The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- Note: This only applies to 4.40.
Detailed salt balance studies are recommended for this area to determine limiting mineral concentration levels for discharge. On the basis of existing data, the tabulated objectives would probably be maintained in most areas. Upon completion of the salt balance studies, significant water quality objective revisions may be necessary. In the interim period of time, projects of ground water recharge with water quality inferior to the tabulated numerical values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing ground water quality in the aquifers affected by the recharge.

17. The Basin Plan contains the following prohibitions which are applicable to the discharge:

"Discharge of treated or untreated sewage or industrial wastewater, exclusive of cooling water or other waters which are chemically unchanged, to a watercourse, is prohibited except in cases where the water quality of said discharge complies with the receiving body water quality objectives."

"Discharging of treated or untreated sewage or industrial wastes in such manner or volume as to cause sustained surface flow or ponding on lands not owned or under control of the discharger is prohibited except in cases defined in the previous paragraph and in cases in which the responsibility for all downstream adverse effects is accepted by the discharger."

"The dumping or deposition of oil, garbage, trash or other solid municipal, industrial or agricultural waste directly into inland waters or watercourses or adjacent to the watercourses in any manner which may permit its being washed into the watercourse is prohibited."

"Dumping or deposition of oil, garbage, trash or other solid municipal, industrial or agricultural waste into natural or excavated sites below historic water levels or deposition of soluble industrial wastes at any site is prohibited, unless such site has been specifically approved by the Regional Board for that purpose."

18. All reclaimed water will be used in hydrologic basins having no ground water quality objectives or a ground water quality objective for TDS of 3,500 mg/l. This Order requires that the TDS concentration in the reclaimed water not exceed a 30-day average of 400 mg/l over the supply water or a daily maximum of 1,500 mg/l. Basin Plan ground water quality objectives for these areas were deleted or relaxed by the Regional Board in accord with the requirements of Resolution 68-16 and other requirements of the California Water Code, in order to encourage the use of reclaimed water in these areas. The discharge is not expected to cause the ground water quality objectives in any of the basins to be exceeded. The discharge of reclaimed water to the areas authorized under this Order will be in conformance with the applicable Basin Plan ground water quality objectives.

19. The discharge of reclaimed water to the areas authorized by this Order is in conformance with Resolution No. 68-16, "Statement of Policy with Respect to Maintaining the High Quality of Waters in California." The wastewater reclamation and reuse projects that will occur in the areas authorized by this Order under the terms and conditions of

this Order will:

- a. Have maximum benefit to the people of the State, because in the absence of reclaimed wastewater, imported potable water would be used for irrigation of the reclaimed water use areas described in this Order;
 - b. Not unreasonably effect the beneficial uses of ground water in the underlying basins; and
 - c. Not cause the ground water objectives of the underlying basins to be exceeded.
20. Finding No. 21 of Addendum No.1 to Order No. 87-82 states that this facility is an existing facility and as such is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) in accordance with Section 15301, Article 19, Title 14, California Code of Regulations.
21. This Order prescribes waste discharge requirements and reclamation requirements governing the production and use of reclaimed water, which the Regional Board has determined are necessary to protect the public health, safety and welfare pursuant to California Water Code, Division 7, Chapter 7, Sections 13500-13550 ("Water Reclamation Law"). This Order, which applies to the producer of reclaimed water, requires that the producer of the reclaimed water establish and enforce rules and regulations which apply to users, including purveyors, of the reclaimed water.
22. An engineering report and a certification report were submitted in accordance with Provision C.21 of Addendum No. 1 to Order No. 87-82 for a flow of 0.75 MGD at the Forest R. Gafner Water Reclamation Plant. The certification report was accepted by the Regional Board Executive Officer on March 19, 1993.
23. The Regional Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:
- (a) Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;
 - (b) Other waste discharges;
 - (c) The need to prevent nuisance;
 - (d) Past, present, and probable future beneficial uses of the hydrologic subunits under consideration;

- (e) Environmental characteristics of the hydrologic subunits under consideration;
- (f) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- (g) Economic considerations;
- (h) The need for additional housing within the region; and
- (i) The need to develop and use recycled water.

24. The Regional Board has considered all water resource related environmental factors associated with the proposed discharge of waste.

25. The Regional Board has notified the Leucadia County Water District and all known interested parties of the intent to prescribe waste discharge requirements for the proposed discharge.

26. The Regional Board in a public meeting heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, that the Leucadia County Water District, hereinafter discharger, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following requirements for the Forest R. Gafner Water Reclamation Plant:

A. PROHIBITIONS

1. Discharges of wastes to lands which have not been specifically described in the report of waste discharge and for which valid waste discharge requirements are not in force are prohibited.
2. The discharge of any radiological, chemical or biological warfare agent, or high-level radiological waste is prohibited.
3. Storage, use and/or disposal of wastes in a manner that would result in ponding or surfacing of wastes on lands beyond the disposal area, as described in the findings of this Order, is prohibited.
4. The discharge of wastewater shall not:
 - (a) Cause the occurrence of coliform or pathogenic organisms in waters pumped from the basins;
 - (b) Cause the occurrence of objectionable tastes and odors in waters pumped from the basins;
 - (c) Cause waters pumped from the basins to foam;
 - (d) Cause the presence of toxic materials in waters pumped from the basins;
 - (e) Cause the pH of waters pumped from the basins to fall below 6.0 or rise above 9.0;
 - (f) Cause this Regional Board's objectives for the ground or surface waters of the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA as established in the Basin Plan to be exceeded;
 - (g) Cause odors, septicity, mosquitos or other vectors, weed growth or other nuisance conditions in any inland watercourse;
 - (h) Cause a surface flow recognizable as sewage in any inland watercourse; or

- (i) Cause a pollution, contamination or nuisance or adversely affect beneficial uses of the ground or surface waters of the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA as established in the Basin Plan.
5. A daily flow from the Forest R. Gafner Water Reclamation Plant in excess of 0.75 million gallons is prohibited unless the discharger obtains revised waste discharge requirements for the proposed increased flow.
6. Odors, vectors, and other nuisances of sewage or sewage sludge origin beyond the limits of the treatment plant site or disposal area are prohibited.
7. The bypassing of wastewater to be used for landscape irrigation which does not meet the discharge specifications of this Order is prohibited.
8. The discharge of waste in a manner other than as described in the Findings of this Order is prohibited unless the discharger obtains revised waste discharge requirements that provide for the proposed changes.
9. Land disposal of wastewater by irrigation in areas for which water reclamation requirements have not been issued is prohibited. Disposal of wastewater to land other than as authorized by waste discharge requirements issued by this Regional Board is prohibited. Disposal of wastewater to waters of the United States other than as authorized by an NPDES permit issued by this Regional Board is prohibited.

OF ORDER:

B. DISCHARGE SPECIFICATIONS

1. The discharge for landscape irrigation and other land disposal projects of a tertiary treated effluent containing pollutants in excess of the following effluent limitations is prohibited:

Effluent Limitations				
Constituent	unit	12-month Average ¹	30-day Average ²	Daily Maximum ³
Biochemical Oxygen Demand (BOD ₅ @ 20 °C)	mg/l		30	45
Total Suspended Solids	mg/l		30	45
PH		Within the	limits of 6.0 to 9.0	at all times
Total Dissolved Solids	mg/l	400		1,500
Chloride	mg/l	200		500
Manganese	mg/l	0.05		0.06
Iron	mg/l	0.3		0.4
Boron	mg/l	0.5		0.6
Coliform	MPN/100ml			
Turbidity	NTU			

- 1 The 12-month average effluent limitation shall apply to the arithmetic mean of the results of quarterly averages of all samples collected during the previous 12 months.
- 2 The 30-day average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 30 consecutive calendar day period.
- 3 The daily maximum effluent limitation shall apply to the results of a single composite or grab sample.
- 4 Increment over water supply based on semiannually analysis of the water supply.
- * The median number of coliform organisms shall not exceed 2.2 per 100 milliliters and the number of coliform organisms shall not exceed 23 per 100 milliliters in more than one sample within any 30-day period.
- ** Not to exceed an average operating turbidity of 2 turbidity units. Not to exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

2. All waste treatment, containment and disposal facilities with the exception of irrigation areas and the La Costa Golf Course reservoir, shall be protected against 100-year peak stream flows as defined by the San Diego County flood control agency.
3. All waste treatment, containment and disposal facilities with the exception of irrigation areas and the La Costa Golf Course reservoir, shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year frequency 24-hour storm.
4. The discharge to any landscape impoundment shall be

terminated whenever rainfall is likely to cause the impoundment to overflow.

5. Collected screenings, sludge, other solids removed from liquid wastes, and filter backwash shall be disposed in a manner approved by the Executive Officer. Before sludge is disposed of by means other than discharge to the Encina Water Pollution Control Facility or a landfill regulated under waste discharge requirements, the discharger shall submit written notification to the Executive Officer of the proposed disposal method. Such disposal, use or supply for use by others shall not be initiated until approved by the Executive Officer.
6. Effluent used for irrigation purposes shall be treated to the most restricted level in conformance with all applicable provisions of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria) for a landscaping irrigation (currently Section 60313 (b) and 60320.5).
7. Effluent storage facilities shall be designed, constructed, operated, and maintained so as to prevent surfacing of wastes on property not owned or controlled by the discharger. Surface runoff of any wastes which surface on property owned or controlled by the discharger onto property not owned or controlled by the discharger shall be prevented.

C. PROVISIONS

1. These WDRs hereby supersede Order No. 87-82, Waste Discharge Requirements for the Leucadia County Water District, Forest R. Gafner Water Reclamation Plant, San Diego County.
2. Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.
3. The discharger must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for (a) enforcement action; (b) termination, revocation and reissuance, or modification of this Order; or (c) denial of a report of waste discharge in application for new or revised waste discharge requirements.
4. In an enforcement action, it shall not be a defense for the discharger that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies for example, when the primary source of power of the treatment facility is failed, reduced, or lost.
5. The discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.
6. The discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

7. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

- (a) Violation of any terms or conditions of this Order;
- (b) Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts; or
- (c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the discharger for the modification, revocation and reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

8. This Order is not transferrable to any person except after notice to the Executive Officer. The Regional Board may require modification or revocation and reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the California Water Code. The discharger shall submit notice of any proposed transfer of this Order's responsibility and coverage to a new discharger as described under Reporting Requirement E.3.

9. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the discharger from liability under federal, state or local laws, nor create a vested right for the discharger to continue the waste discharge.

10. The discharger shall allow the Regional Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

- (a) Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
- (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

- (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.
11. The discharger's wastewater treatment facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23 of the California Code of Regulations.
 12. A copy of this Order shall be maintained at the Forest R. Gafner Water Reclamation Plant and shall be available to operating personnel at all times.
 13. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.
 14. The potable water supply shall not be used to supplement the reclaimed water supply except through an approved air gap. In other areas where the potable water supply is piped to premises where sewage is pumped, treated or reclaimed (e.g., sewage treatment plants or pumping stations, golf course, etc.) the potable water supply shall be protected at the property line in accordance with the State Department of Health Services' Regulations Relating to Cross-Connections.
 15. The discharge to the reclaimed water users shall not be initiated until:
 - a. An inspection of the facilities has been made by Regional Board staff; and
 - b. Regional Board staff has notified the discharger by letter that the discharge can be initiated.

D. RECLAIMED WATER USE PROVISIONS

1. If the Leucadia County Water District (discharger/producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District in the areas authorized under these waste discharge requirements, the discharger/producer shall have Rules and Regulations for Reclaimed Water Users governing the design and construction of reclaimed water use facilities and the use of reclaimed water. The Rules and Regulations shall be reviewed and updated if necessary by the discharger/producer when a new Order or Addendum is adopted by the Regional Board, and shall, at a minimum, contain the following provisions:

- a. Provisions implementing Title 22, Division 4, Chapter 3, Wastewater Reclamation Criteria, and Title 17, Division 1, Chapter 5, Group 4, Article 1 & 2, of the California Code of Regulations;

- b. Provisions implementing the State Department of Health Services (DOHS) Guidelines For Use of Reclaimed Water and Guidelines for Use of Reclaimed Water for Construction Purposes and measures that are deemed necessary for protection of public health, such as the American Water Works Association (AWWA) California/Nevada Section, Guidelines for the Distribution of Non-Potable Water or alternate measures, acceptable to DOHS, providing equivalent protection of public health;

- c. Provisions authorizing the Regional Board, the discharger/producer, or an authorized representative of these parties, upon presentation of proper credentials, to inspect the facilities of any reclaimed water user to ascertain whether the user is complying with the discharger/producer's rules and regulations;

- d. Provision for written notification, in a timely manner, to the discharger/producer by the reclaimed water user of any material change or proposed change in the character of the use of reclaimed water;

- e. Provision for submission of a preconstruction report to the discharger/producer by the reclaimed water user in order to enable the discharger/producer to determine whether the user will be in compliance with the discharger/producer's rules and regulations;

- f. - Provision requiring reclaimed water users to designate a reclaimed water supervisor responsible for the reclaimed water system at each use area under the user's control. Reclaimed water supervisors should be responsible for the installation, operation, and maintenance of the irrigation system, enforcement of the discharger/producer's reclaimed water user rules and regulations, prevention of potential hazards, and maintenance of the reclaimed water distribution system plans in "as built" form;
- g. Provision authorizing the discharger/producer to cease supplying reclaimed water to any person who uses, transports, or stores such water in violation of the discharger/producer's rules and regulations;
- h. Provision requiring notification and concurrence of the State Department of Health Services and the San Diego County Department of Health Services, Environmental Health Services for new reclaimed water users. The notification of Environmental Health Services shall include a site distribution plan for new and retrofit facilities and a cross-connection control inspection plan for sites containing both potable and reclaimed water distribution lines;
- i. Provision requiring all windblown spray and surface runoff of reclaimed water applied for irrigation onto property not owned or controlled by the discharger or reclaimed water user shall be prevented by implementation of best management practices;
- j. Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24 hour frequency storm unless the Regional Board Executive Officer approves relaxed storm protection measures for the facility;
- k. Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against 100 - year frequency peak stream flows as defined by the San Diego County flood control agency unless the Regional Board Executive Officer approves relaxed storm protection measures for the facility;

1. Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against any reclaimed water user who discharges reclaimed water in violation of any applicable discharge prohibitions prescribed by the Regional Board or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050; and

m. Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against the discharger/producer, which may result in the termination of the reclaimed water supply, if any person uses, transports, or stores such water in violation of the discharger/producer's rules and regulations or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050.

The revised rules and regulations shall be subject to the approval of the Regional Board Executive Officer; the State Department of Health Services; and the San Diego County Department of Health Services, Environmental Health Services. The revised rules and regulations or a letter certifying that the discharger/producer's rules and regulations contain the updated provisions in the Order, shall be submitted to the Regional Board within 90 days of adoption of this Order by the Regional Board.

2. If the Leucadia County Water District (discharger/producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall implement and enforce the approved rules and regulations for reclaimed water users. Use of reclaimed water by the discharger/producer shall be consistent with provisions a. through m. in item D.1 above. In addition, the discharger/producer shall submit an annual report certifying that the users have implemented the Rules and Regulations established by the discharger.

3. If the Leucadia County Water District (discharger/producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall within 90 days of the adoption of this order, develop and submit to the Regional Board a program of Best Management Practices (BMP) for the reclaimed water users governing the irrigation practices, management and maintenance to avoid runoff, ponding, and overspray. The

discharger/producer shall oversee that the reclaimed water users have implemented the BMP upon approval of the BMP program by the Regional Board Executive Officer.

4. If the Leucadia County Water District (discharger/producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall, within 90 days of the adoption of this Order, develop and submit to the Regional Board a program to conduct compliance inspections of reclaimed water reuse sites to determine the status of compliance with the approved rules and regulations for reclaimed water users. The discharger/producer shall implement the inspection program upon its approval by the Regional Board Executive Officer.
5. Reclaimed water shall not be supplied to parties who use, transport, or store such water in a manner which causes a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.
6. Prior to using reclaimed water or supplying reclaimed water for use by other parties in any manner or in any area other than as described in the findings of this Order, the discharger/producer shall obtain proper authorization from this Regional Board.

E. REPORTING REQUIREMENTS

1. The discharger shall file a new Report of Waste Discharge at least 120 days prior to the following:

- (a) Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the wastes.

- (b) Significant change in the treatment or disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste.)

- (c) Change in the disposal area from that described in the findings of this Order.

- (d) Increase in flow beyond that specified in this Order.

- (e) Other circumstances which result in a material change in character, amount, or location of the waste discharge.

- (f) Any planned change in the regulated facility or activity which may result in noncompliance with this Order.

2. The discharger shall furnish to the Executive Officer of this Regional Board, within a reasonable time, any information which the Executive Officer may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The discharger shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.

3. The discharger must notify the Executive Officer, in writing at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new discharger. The notice must include a written agreement between the existing and new discharger containing a specific date for the transfer of this Order's responsibility and coverage between the current discharger and the new discharger. This agreement shall include an acknowledgement that the existing discharger is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on.

4. The discharger shall comply with attached Monitoring and Reporting Program No. 93-41, and future revisions thereto as specified by the Executive Officer. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. 93-41.
5. If a need for a discharge bypass is known in advance, the discharger shall submit prior notice and, if at all possible, such notice shall be submitted at least 10 days prior to the date of the bypass.
6. Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information.
7. The discharger shall report any noncompliance which may endanger health or the environment. Any such information shall be provided orally to the Executive Officer within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the Executive Officer within 24 hours:
 - (a) Any bypass from any portion of the treatment facility.
 - (b) Any discharge of treated or untreated wastewater resulting from sewer line breaks, obstruction, surcharge or any other circumstances.
 - (c) Any treatment plant upset which causes the effluent limitations of this Order to be exceeded.
8. Whenever a publicly owned wastewater treatment plant will reach capacity within four years the discharger shall notify the Regional Board. A copy of such

notification shall be sent to appropriate local elected officials, local permitting agencies and the press. The discharger must demonstrate that adequate steps are being taken to address the capacity problem. The discharger shall submit a technical report to the Regional Board showing flow volumes will be prevented from exceeding capacity, or how capacity will be increased, within 120 days after providing notification to the Regional Board, or within 120 days after receipt of notification from the Regional Board, of a finding that the treatment plant will reach capacity within four years. The time for filing the required technical report may be extended by the Regional Board. An extension of 30 days may be granted by the Executive Officer, and longer extensions may be granted by the Regional Board itself.

9. The discharger shall submit a facility operations manual within 90 days of the adoption of this Order.

10. All applications, reports, or information submitted to the Executive Officer shall be signed and certified as follows:

(a) The Report of Waste Discharge shall be signed as follows:

- (1) For a corporation - by a principal executive officer of at least the level of vice-president.
- (2) For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
- (3) For a municipality, state, federal or other public agency - by either a principal executive officer or ranking elected official.

(b) All other reports required by this Order and other information required by the Executive Officer shall be signed by a person designated in paragraph (a) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:

- (1) The authorization is made in writing by a person described in paragraph (a) of this provision;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and

(3) The written authorization is submitted to the Executive Officer.

(c) Any person signing a document under this Section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

11. The discharger shall submit reports required under this Order, or other information required by the Executive Officer, to:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd, Suite B
San Diego, California 92124-1331

F. NOTIFICATIONS

1. California Water Code Section 13263(g) states:

"No discharge of waste into waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights"

2. These requirements have not been officially reviewed by the United States Environmental Protection Agency and are not issued pursuant to Section 402 of the Clean Water Act.

3. The California Water Code provides that any person who intentionally or negligently violates any waste discharge requirements issued, reissued, or amended by this Regional Board is subject to a civil monetary remedy of up to 20 dollars per gallon of waste discharged or, if a cleanup and abatement order is issued, up to 15,000 dollars per day of violation or some combination thereof.

4. The California Water Code provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or falsifying any information provided in the monitoring reports is guilty of a misdemeanor.

5. This Order becomes effective on the date of adoption by the Regional Board.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on December 20, 1993.



Arthur L. Coe
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

MONITORING AND REPORTING PROGRAM NO. 93-41
FOR THE
LEUCADIA COUNTY WATER DISTRICT
FOREST R. GAFNER WATER RECLAMATION PLANT
SAN DIEGO COUNTY

A. MONITORING PROVISIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this Order and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Executive Officer.
2. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 5 percent from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration and operation of acceptable flow measurement devices can be obtained from the following references:
 - (a) "A Guide to Methods and Standards for the Measurement of Water Flow," U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD Catalog No. C13.10:421.)
 - (b) "Water Measurement Manual," U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington D.C. 20402. Order by Catalog No. 127,19/2:W29/2, Stock No. S/N 24003-0027.)
 - (c) "Flow Measurement in Open Channels and Closed

- Conduits," U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS) Springfield, VA 22151. Order by NTIS No. PB-273-535/5ST.)
- (d) "NPDES Compliance Sampling Manual," U.S. Environmental Protection Agency, Office of Water Enforcement. Publication MCD-51, 1977, 140 pp.
 - (Available from the General Services Administration (8FFS), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225.)
- 3. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified in this Order.
- 4. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
- 5. Monitoring results must be reported on discharge monitoring report forms approved by the Executive Officer.
- 6. If the discharger monitors any pollutants more frequently than required by this Order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the discharger's monitoring report. The increased frequency of monitoring shall also be reported.
- 7. The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.
- 8. Records of monitoring information shall include:

- (a) The date, exact place, and time of sampling or measurements;
 - (b) The individual(s) who performed the sampling or measurements;
 - (c) The date(s) analyses were performed;
 - (d) The individual(s) who performed the analyses;
 - (e) The analytical techniques or method used; and
 - (f) The results of such analyses.
9. All monitoring instruments and devices which are used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.
10. The discharger shall report all instances of noncompliance not reported under Reporting Requirement E.7 of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Reporting Requirement E.7.
11. The monitoring reports shall be signed by an authorized person as required by Reporting Requirement E.10.
12. A composite sample is defined as a combination of at least eight sample aliquot of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24 hour period. For volatile pollutants, aliquot must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquot may be collected manually or automatically.
13. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.
14. Sampling and analysis shall, as a minimum, be conducted in accordance with Article 6 of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria).

B. EFFLUENT MONITORING

1. The sampling station shall be at the end of the chlorine contact chamber, where the effluent is not diluted by any other waste stream, body of water, or substance.
2. The Leucadia County Water District shall review the Forest R. Gafner Water Reclamation Plant monitoring results for compliance with the following effluent limitations specified in Order No. 93-41 and submit a statement of compliance as part of Monitoring and Reporting Program No. 93-41. The statement of compliance shall identify and report all effluent limitation violations of Discharge Specifications No. B.1. of this Order. The following monitoring program shall constitute the effluent monitoring program for the Forest R. Gafner Water Reclamation Plant specific to this Order:

Monitoring Program				
Determination	Unit	Sample Type	Sampling Frequency	Reporting Frequency
Flowrate	GPD	Continuous	Continuous	Quarterly
Biochemical Oxygen Demand (5-day @ 20°C)	mg/l	Composite	Weekly	Quarterly
Total Suspended Solids	mg/l	Composite	Weekly	Quarterly
Volatile Suspended Solids	mg/l	Composite	Weekly	Quarterly
PH		Composite	Weekly	Quarterly
Total Dissolved Solids	mg/l	Composite	Quarterly	Quarterly
Chloride	mg/l	Composite	Quarterly	Quarterly
Adjusted Sodium Adsorption ratio		Composite	Quarterly	Quarterly
Electrical Conductivity	mmho/cm	Composite	Quarterly	Quarterly
Sulfate	mg/l	Composite	Quarterly	Quarterly
Iron	mg/l	Composite	Quarterly	Quarterly
Manganese	mg/l	Composite	Quarterly	Quarterly
Methylene Blue Active Substances	mg/l	Composite	Quarterly	Quarterly
Boron	mg/l	Composite	Quarterly	Quarterly
Fluoride	mg/l	Composite	Quarterly	Quarterly
Aluminium	mg/l	Composite	Annually	Annually
Arsenic	mg/l	Composite	Annually	Annually
Barium	mg/l	Composite	Annually	Annually
Cadmium	mg/l	Composite	Annually	Annually
Chromium	mg/l	Composite	Annually	Annually
Copper	mg/l	Composite	Annually	Annually
Lead	mg/l	Composite	Annually	Annually
Zinc	mg/l	Composite	Annually	Annually
Mercury	mg/l	Composite	Annually	Annually
Selenium	mg/l	Composite	Annually	Annually
Silver	mg/l	Composite	Annually	Annually
Coliform	MPN/ 100 ml	Grab		Quarterly
Turbidity	NTU	Continuous		Quarterly
Chlorine Residual	mg/l	Continuous		Quarterly

- * Samples for coliform bacteria shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. In addition, one day in each quarter, 5 representative samples (one every 3 hours within a 12 hours period) shall be collected and reported in that quarter.
- ** Turbidity analysis shall be performed by a continuous recording turbidimeter. From the continuous recording turbidimeter, the discharger shall report, on a daily log, whether the estimated average value is above or below 2 NTUs of each day. If the turbidity value exceeds 5 NTUs at any time, its duration shall also be reported on a daily log.
- *** Chlorine residual analysis shall be performed by a continuous recording meter. The average value of each day shall be estimated from the flow chart and shall be reported monthly.

Note: MGD = Million gallons per day
 mg/l = milligrams per liter
 NTU = Nephelometric Turbidity Units

mmho/cm = inverse of milliohms per centimeter
 MPN/100 ml = Most Probable Number per 100 milliliters

3. The monitoring report shall indicate the flowrate and Title 22 levels being achieved in the effluent discharged for land disposal and/or reclamation from the Forest R. Gafner Water Reclamation Plant. Flowrate reported in the monitoring report shall be representative of the flow discharged from the Title 22 treatment facility.

C. POTABLE SUPPLY WATERS

Analysis of the potable waters supplied to the service areas of the wastewater treatment facilities shall be conducted for the following constituent quarterly with the results reported quarterly.

CONSTITUENT	UNIT
Total Dissolved Solids	mg/l
Chloride	mg/l
Sulfate	mg/l

D. RECEIVING WATER - SAN MARCOS CREEK

The discharger shall monitor the receiving water from November through March. The following table constitutes the receiving water monitoring program. The monitoring outlined in the table is to be conducted at the following monitoring stations:

- a) a station within 250 ft. upstream of the storage reservoir;
- b) a station within 250 ft. downstream of the storage reservoir; and

- c) a station located where the discharge first contacts the receiving water during an overflow.

PARAMETER	UNITS	SAMPLE TYPE	SAMPLING FREQUENCY	REPORTING FREQUENCY
Flowrate	GPD	Meter	Monthly ¹	Monthly
Total Dissolved Solids	mg/l	Grab	Monthly ¹	Monthly
Total Hardness	mg/l	Grab	Monthly ¹	Monthly

- ¹ If there is an overflow, the discharger shall begin monitoring on the first day of the overflow and continue monitoring daily until the overflow of the reservoir has been terminated.

E. SEWAGE SOLIDS

A record of the type, quantity, and manner of disposal and/or reuse of solids removed in the course of sewage treatment shall be maintained at the facility and made available to the Regional Board staff.

F. RECLAIMED WATER USERS SUMMARY REPORT

1. If the Leucadia County Water District is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger shall submit a quarterly reclaimed water users summary report containing the following information:

- a) Total volume of reclaimed water supplied to all reclaimed water users for each month of the reporting period.
- b) Total number of reclaimed water use sites.
- c) Address of the reclaimed water use site
- d) Basin Plan name and number of hydrologic subarea underlying the reclaimed water use site

2. If the Leucadia County Water District is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger shall submit an annual reclaimed water users compliance report containing the following information:

- a) Reclaimed water use site summary information

The following information shall be submitted for each reclaimed water use site.

- 1) Name of the reclaimed water use site

- 2) Owner of the reclaimed water use facility
- 3) Name of the reclaimed water use supervisor
- 4) Phone number of the reclaimed water use supervisor
- 5) Mailing address of the reclaimed water use supervisor, if different from site address
- 6) Volume of reclaimed water delivered to the reclaimed water use site on a monthly basis.

b) Reclaimed water use site inspections

Number of reclaimed water use site inspections conducted by discharger/producer staff and identification of sites inspected for the reporting period.

c) Reclaimed water user violations of the discharger's rules and regulations

The discharger shall identify all reclaimed water users known by the discharger to be in violation of the discharger's rules and regulations for reclaimed water users. The report shall include a description of the noncompliance and its cause, including the period of noncompliance, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

G. REPORTING

Monitoring reports shall be submitted to the Executive Officer in accordance with the following schedule:

<u>Reporting Frequency</u>	<u>Report Period</u>	<u>Report Due</u>
Monthly	January, February, March, April, May, June, July, August, September, October, November, December	By the 30 th day of the following month
Quarterly	January-March April-June July-September October-December	April 30 July 30 October 30 January 30

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. 93-23

WASTE DISCHARGE REQUIREMENTS
FOR THE
VALLECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

The California Regional Water Quality Control Board, San Diego Region, (hereinafter Regional Board) finds that:

1. On March 26, 1979, this Regional Board adopted Order No. 79-23, "Waste Discharge Requirements for the San Marcos County Water District Wastewater Reclamation Project Near San Marcos Creek." Order No. 79-23 and Addenda thereto established requirements for the discharge of treated effluent from the Meadowlark Water Reclamation Plant (Meadowlark WRP) to land disposal facilities.
2. On May 4, 1987, this Regional Board adopted Order No. 87-81, "Waste Discharge Requirements for San Marcos County Water District, Meadowlark Water Reclamation Plant, San Diego County." On May 1, 1989, the agency name was changed from San Marcos County Water District to Vallecitos Water District. Order No. 87-81 rescinded Order No. 79-23 and established new waste discharge requirements for the disposal and of up to 2.0 million gallons per day (MGD) of tertiary treated wastewater from Meadowlark WRP.
3. As a part of the FY 1992/93 Waste Discharge Order Update Program, Order No. 87-81 has been reviewed by the Regional Board staff in accordance with criteria established in the Administrative Procedures Manual adopted by the State Water Resources Control Board. As a result of this review, modifications have been incorporated into this Order. This Order, which supersedes Order No. 87-81, consolidates and makes changes to the Findings, Requirements, and Monitoring and Reporting Program of Order No. 87-81.
4. This Order authorizes the Vallecitos Water District to supply reclaimed water to the Carlsbad Municipal Water District from Meadowlark WRP for distribution anywhere in the City of Carlsbad where the ground water quality objectives do not apply or are 3,500 milligrams per liter (mg/l) for total dissolved solids (TDS). There are

currently 40 reuse sites, with the major users being the Aviara Master Association and La Costa Hotel & Spa. In the future, more sites may become available for reclaimed water use.

5. On May 20, 1991, this Regional Board adopted Order No. 91-60, "Water Reclamation Requirements for the purveyance of reclaimed water by the Carlsbad Municipal Water District, San Diego County." Order No. 91-60 authorizes the Carlsbad Municipal Water District to purvey water from the Shadowridge WRP, the Meadowlark WRP, and the Gafner WRP to the portions of the City of Carlsbad described in the Findings above.
6. The treatment facilities are located in the SE1/4 of the NE1/4, Section 30, T12S, R3W, SBB&M. The effluent storage pond is located in the N1/2 of the NW1/4, Section 32, T12S, R3W, SBB&M.
7. The discharger reported that the wastewater treatment, transmission, and storage facilities would be protected against runoff and flooding by 100-year frequency rainfalls and flood flows. The discharger further reported that the public would be excluded from the wastewater treatment and storage facilities.
8. The discharger reports that up to 2.0 MGD of treated effluent would be discharged to the Encina Ocean Outfall during wet weather periods and other periods when irrigation demand is less than the reclaimed water supply. The discharge of effluent to the Encina Ocean Outfall is regulated by this Regional Board's National Pollutant Discharge Elimination System permit for the Encina Ocean Outfall.
9. The discharger reports that an existing 54 million gallon capacity reservoir will be used to equalize the effluent flow prior to reuse or ocean disposal.
10. The discharger reported that sludge from the Meadowlark Water Reclamation Plant is conveyed by existing pipelines to the Encina Water Pollution Control Facility for processing.
11. The existing disposal areas are located in the Carlsbad (4.00) Hydrologic Unit (HU) and in the following Hydrologic Areas (HA) and Subareas (HSA):
 - a. Buena Vista Creek (4.20) HA, El Salto (4.21) HSA within the City of Carlsbad;
 - b. Agua Hedionda (4.30) HA, Los Monos (4.31) HSA within the City of Carlsbad;

- c. Encinas (4.40) HA within the City of Carlsbad;
 - d. San Marcos (4.50) HA, Batiquitos (4.51) HSA within the City of Carlsbad; and
 - e. San Marcos (4.50) HA, Richland (4.52) HSA.
12. The "Comprehensive Water Quality Control Plan Report, San Diego Basin (9) (Basin Plan)", was adopted by this Regional Board on March 17, 1975 and subsequently approved by the State Water Resources Control Board (State Board). Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board.
13. The Basin Plan established the following beneficial uses of surface water and ground water in the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA:

Beneficial Uses Identified in Basin Plan											
Beneficial Use		Surface Water					Groundwater				
		4.21	4.31	4.40	4.51	4.52	4.21 ¹	4.31 ¹	4.40	4.51 ¹	4.52 ¹
MUN	Municipal and Domestic Supply		X				X	O		O ⁴	X ⁵
AGR	Agriculture Supply	X	X		X	X	O	X ² O ³		O ⁴	X ⁵
IND	Industrial Service Supply	X	X				O	O		O ⁴	X ⁵
PROC	Industrial Process Supply										
GWR	Groundwater Recharge										
FRESH	Freshwater Replenishment										
POW	Hydropower Generation										
REC-1	Water Contact Recreation	X	X		X	X					
REC-2	Non-Contact Water Recreation	X	X	X	X	X					
WARM	Warm Fresh-Water Habitat	X			X	X					
COLD	Cold Fresh-Water Habitat										
WILD	Wildlife Habitat	X	X	X	X	X					
RARE	Preservation of Rare & Endangered Species	X	X	X	X	X					

Notes: O Potential beneficial uses.
X Existing beneficial uses.

- These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate Highway 5. The beneficial uses for the remainder of the hydrologic area are as shown.
- These beneficial uses designations apply to the portion of subarea 4.31 tributary to Agua Hedionda Creek downstream from the El Camino Real Crossing, except lands tributary to Marcario Canyon (located directly southerly of Evans Point), land directly south of Agua Hedionda Lagoon, and areas west of Interstate Highway 5.
- These beneficial use designations apply to the portion of subarea 4.31 bounded on the west by the easterly boundary of the Interstate Highway 5 right-of-way; on the east by the easterly boundary of El Camino Real; and on the north by a line extending along the southerly edge of Agua Hedionda Lagoon to the easterly edge of the Agua Hedionda Lagoon, thence in an easterly direction to Evans Point, thence easterly to El Camino Real along the ridge lines separating Letterbox Canyon and the area draining to Marcario Canyon.

- 4 These beneficial use designations apply to the portion of subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate Highway 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- 5 The beneficial uses do not apply to hydrologic subarea 4.51 and hydrologic subarea 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and to Encinitas Creek. The beneficial uses for the remainder of the subarea are as shown.
14. The Basin Plan established the following water quality objectives for the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA:

Basin Plan Water Quality Objectives				
CONSTITUENT	Concentration not to be exceeded <u>more than 10 percent of the time</u> during any one year period (mg/l or as noted)			
	Inland Surface Water	Groundwater		
	4.21, 4.31, 4.40, 4.51, 4.52	4.21 ¹ , 4.31 ^{1,2} , 4.40 ¹ , 4.51 ^{1,3,4}	4.31 ¹	4.52 ^{1,3}
Total Dissolved Solids	500	3500 _s	1200	1000
Chloride	250	800 _s	500	400
Percent Sodium	60 %	60 %	60 %	60 %
Sulfate	250	500 _s	500	500
Nitrate (as NO ₃)	---	45 _s	10	10
Nitrogen and Phosphorus	---	---	---	---
Iron	0.3	0.3 _s	0.3	0.3
Manganese	0.05	0.05 _s	0.05	0.05
Methylene Blue Active Substances	0.5	0.5	0.5	0.5
Boron	0.5	2.0 _s	2.0	0.5
Odor	None	None	None	None
Turbidity	20 NTU	5 NTU	5 NTU	5 NTU
Color	20 Units	15 Units	15 Units	15 Units
Fluoride	1.0	1.0	1.0	1.0

Note: mg/l = milligrams per liter

NTU = Nephelometric turbidity units

* Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any reservoir or lake, nor 0.025 mg/l in any reservoir or lake. A desired goal in flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds, however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 shall be used.

¹ The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the hydrologic area (subarea) are as shown.

- 2 The water quality objectives apply to the portion of Subarea 4.31 bounded on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- 3 The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5, the hydrologic subarea 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and Encinitas Creek. The objectives for the remainder of the hydrologic area (subarea) are as shown. The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- 4 The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.
- 5 Note: This only applies to 4.40.
Detailed salt balance studies are recommended for this area to determine limiting mineral concentration levels for discharge. On the basis of existing data, the tabulated objectives would probably be maintained in most areas. Upon completion of the salt balance studies, significant water quality objective revisions may be necessary. In the interim period of time, projects of ground water recharge with water quality inferior to the tabulated numerical values may be permitted following individual review and approval by the Regional Board if such projects do not degrade existing ground water quality in the aquifers affected by the recharge.

15. The Basin Plan contains the following prohibitions which are applicable to the discharge:

"Discharge of treated or untreated sewage or industrial wastewater, exclusive of cooling water or other waters which are chemically unchanged, to a watercourse, is prohibited except in cases where the water quality of said discharge complies with the receiving body water quality objectives."

"Discharging of treated or untreated sewage or industrial wastes in such manner or volume as to cause sustained surface flow or ponding on lands not owned or under control of the discharger is prohibited except in cases defined in the previous paragraph and in cases in which the responsibility for all downstream adverse effects is accepted by the discharger."

"The dumping or deposition of oil, garbage, trash or other solid municipal, industrial or agricultural waste directly into inland waters or watercourses or adjacent to the watercourses in any manner which may permit its being washed into the watercourse is prohibited."

"Dumping or deposition of oil, garbage, trash or other solid municipal, industrial or agricultural waste into natural or excavated sites below historic water levels or deposition of soluble industrial wastes at any site is prohibited, unless such site has been specifically approved by the Regional Board for that purpose."

16. This facility is an existing facility and as such is exempt

from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) in accordance with Section 15301, Article 19, Title 14, California Code of Regulations.

17. All reclaimed water will be used in hydrologic basins having no ground water quality objectives or a ground water quality objective for TDS of 3,500 mg/l. This Order requires that the TDS concentration in the reclaimed water not exceed a 30-day average of 400 mg/l over the supply water or a daily maximum of 1,500 mg/l. Basin Plan ground water quality objectives for these areas were deleted or relaxed by the Regional Board in accord with the requirements of resolution 68-16 and other requirements of the California Water Code, in order to encourage the use of reclaimed water in these areas. The discharge is not expected to cause the ground water quality objectives in any of the basins to be exceeded. The discharge of reclaimed water to the areas authorized under this Order will be in conformance with the applicable Basin Plan ground water quality objectives.
18. The discharge of reclaimed water to the areas authorized by this Order is in conformance with Resolution No. 68-16, **"Statement of Policy with Respect to Maintaining the High Quality of Waters in California."** The wastewater reclamation and reuse projects that will occur in the areas authorized by this Order under the terms and conditions of this Order will:
 - a. Have maximum benefit to the people of the State, because in the absence of reclaimed wastewater, imported potable water would be used for irrigation of the reclaimed water use areas described in this Order;
 - b. Not unreasonably effect the beneficial uses of ground water in the underlying basins; and
 - c. Not cause the ground water objectives of the underlying basins to be exceeded.
19. This Order prescribes waste discharge requirements and reclamation requirements governing the production and use of reclaimed water, which the Regional Board has determined are necessary to protect the public health, safety and welfare pursuant to California Water Code, Division 7, Chapter 7, Sections 13500-13550 ("Water Reclamation Law"). This Order, which applies to the producer of reclaimed water, requires that the producer of the reclaimed water establish and enforce rules and regulations which apply to users, including purveyors, of the reclaimed water.
20. The Regional Board, in establishing the requirements

contained herein, considered factors including, but not limited to, the following:

- (a) Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;
 - (b) Other waste discharges;
 - (c) The need to prevent nuisance;
 - (d) Past, present, and probable future beneficial uses of the hydrologic subunits under consideration;
 - (e) Environmental characteristics of the hydrologic subunits under consideration;
 - (f) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
 - (g) Economic considerations;
 - (h) The need for additional housing within the region; and
 - (i) The need to develop and use recycled water.
- 21. The Regional Board has considered all water resource related environmental factors associated with the proposed discharge of waste.
 - 22. The Regional Board has notified the Vallecitos Water District and all known interested parties of the intent to prescribe waste discharge requirements for the proposed discharge.
 - 23. The Regional Board in a public meeting heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, that the Vallecitos Water District, hereinafter discharger, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following requirements for the Meadowlark Water Reclamation Plant:

A. PROHIBITIONS

1. Discharges of wastes to lands which have not been specifically described in the report of waste discharge and for which valid waste discharge requirements are not in force are prohibited.
2. The discharge of any radiological, chemical or biological warfare agent, or high-level radiological waste is prohibited.
3. Storage, use and/or disposal of wastes in a manner that would result in ponding or surfacing of wastes on lands beyond the disposal area, as described in the findings of this Order, is prohibited.
4. The discharge of wastewater shall not:
 - (a) Cause the occurrence of coliform or pathogenic organisms in waters pumped from the basins;
 - (b) Cause the occurrence of objectionable tastes and odors in waters pumped from the basins;
 - (c) Cause waters pumped from the basins to foam;
 - (d) Cause the presence of toxic materials in waters pumped from the basins;
 - (e) Cause the pH of waters pumped from the basins to fall below 6.0 or rise above 9.0;
 - (f) Cause this Regional Board's objectives for the ground or surface waters of the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA as established in the Basin Plan to be exceeded;
 - (g) Cause odors, septicity, mosquitos or other vectors, weed growth or other nuisance conditions in any inland watercourse;
 - (h) Cause a surface flow recognizable as sewage in any inland watercourse; or

- (i) Cause a pollution, contamination or nuisance or adversely affect beneficial uses of the ground or surface waters of the El Salto (4.21) HSA, the Los Monos (4.31) HSA, the Encinas (4.40) HA, the Batiquitos (4.51) HSA, and the Richland (4.52) HSA as established in the Basin Plan.

Add No. 1
2.25MGD (5.)

A maximum flowrate from at the Meadowlark Water Reclamation Plant in excess of 2.0 MGD is prohibited unless the discharger obtains revised waste discharge requirements for the proposed increased flow.

6. Odors, vectors, and other nuisances of sewage or sewage sludge origin beyond the limits of the treatment plant site or disposal area are prohibited.
7. The bypassing of wastewater to be used for landscape irrigation which does not meet the discharge specifications of this Order is prohibited.
8. The discharge of waste in a manner other than as described in the Findings of this Order is prohibited unless the discharger obtains revised waste discharge requirements that provide for the proposed changes.
9. The discharge of treated or untreated wastewater to San Marcos Creek or its tributaries is prohibited.
10. Land disposal of wastewater by irrigation in areas for which water reclamation requirements have not been issued is prohibited. Disposal of wastewater to land other than as authorized by waste discharge requirements issued by this Regional Board is prohibited. Disposal of wastewater to waters of the United States other than as authorized by an NPDES permit issued by this Regional Board is prohibited.

B. DISCHARGE SPECIFICATIONS

1. The discharge for landscape irrigation and other land disposal projects of a tertiary treated effluent containing pollutants in excess of the following effluent limitations is prohibited:

Effluent Limitations			
Constituent	unit	30-day Average ¹	Daily Maximum ²
Biochemical Oxygen Demand (BOD ₅ @ 20°C)	mg/l	30	45
Total Suspended Solids	mg/l	30	45
PH	Within the	limits of 6.0 to 9.0	at all times
Total Dissolved Solids	mg/l	400 ³	1,500
Chloride	mg/l	200 ³	500
Manganese	mg/l	0.05	0.06
Iron	mg/l	0.3	0.4
Boron	mg/l	0.5	0.6
Coliform	MPN/100ml	*	*
Turbidity	NTU	**	**

- 1 The 30-day average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 30 consecutive calendar day period.
- 2 The daily maximum effluent limitation shall apply to the results of a single composite or grab sample.
- 3 Increment over water supply based on semiannually analysis of the water supply.
- * The median number of coliform organisms shall not exceed 2.2 per 100 milliliters and the number of coliform organisms shall not exceed 23 per 100 milliliters in more than one sample within any 30-day period.
- ** Not to exceed an average operating turbidity of 2 turbidity units. Not to exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

2. All waste treatment, containment and disposal facilities shall be protected against 100-year peak stream flows as defined by the San Diego County flood control agency.
3. All waste treatment, containment and disposal facilities shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year frequency 24-hour storm.
4. Collected screening, sludge, other solids removed from liquid wastes, and filter backwash shall be disposed in a manner approved by the Executive Officer. Before

sludge is disposed of by means other than discharge to a landfill regulated under waste discharge requirements, used or supplied for use by others, the discharger shall submit written notification to the Executive Officer of the proposed disposal method or use. Such disposal, use or supply for use by others shall not be initiated until approved by the Executive Officer.

5. Effluent used for irrigation purposes shall be treated to the most restricted level in conformance with all applicable provisions of California Code of Regulations, Title 22, Division 4, Chapter 3 (**Reclamation Criteria**) for a nonrestricted recreational impoundment (currently Section 60315).
6. Effluent storage facilities shall be designed, constructed, operated, and maintained so as to prevent surfacing of wastes on property not owned or controlled by the discharger. Surface runoff of any wastes which surface on property owned or controlled by the discharger onto property not owned or controlled by the discharger shall be prevented.

C. PROVISIONS

1. These WDRs hereby supersede Order No. 87-81, **Waste Discharge Requirements for the Vallecitos Water District, Meadowlark Water Reclamation Plant, San Diego County.** Order No. 87-81 is hereby rescinded when this Order becomes effective.
2. Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.
3. The discharger must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for (a) enforcement action; (b) termination, revocation and reissuance, or modification of this Order; or (c) denial of a report of waste discharge in application for new or revised waste discharge requirements.
4. In an enforcement action, it shall not be a defense for the discharger that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies for example, when the primary source of power of the treatment facility is failed, reduced, or lost.
5. The discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.
6. The discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with

the conditions of this Order.

7. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:
 - (a) Violation of any terms or conditions of this Order;
 - (b) Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts; or
 - (c) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the discharger for the modification, revocation and reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

8. This Order is not transferrable to any person except after notice to the Executive Officer. The Regional Board may require modification or revocation and reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the California Water Code. The discharger shall submit notice of any proposed transfer of this Order's responsibility and coverage to a new discharger as described under Reporting Requirement E.3.
9. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the discharger from liability under federal, state or local laws, nor create a vested right for the discharger to continue the waste discharge.
10. The discharger shall allow the Regional Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:
 - (a) Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
 - (b) Have access to and copy, at reasonable times, any

records that must be kept under the conditions of this Order;

- (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.
- 11. The discharger's wastewater treatment facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23 of the California Code of Regulations.
 - 12. A copy of this Order shall be maintained at the Meadowlark Water Reclamation Plant and shall be available to operating personnel at all times.
 - 13. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.
 - 14. The potable water supply shall not be used to supplement the reclaimed water supply except through an approved air gap. In other areas where the potable water supply is piped to premises where sewage is pumped, treated or reclaimed (e.g., sewage treatment plants or pumping stations, golf course, etc.) the potable water supply shall be protected at the property line in accordance with the State Department of Health Services' Regulations Relating to Cross-Connections.

D. RECLAIMED WATER USE PROVISIONS

1. If the Vallecitos Water District (discharger/ producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District in the areas authorized under these waste discharge requirements, the discharger/producer shall have **Rules and Regulations for Reclaimed Water Users** governing the design and construction of reclaimed water use facilities and the use of reclaimed water. The Rules and Regulations shall be reviewed and updated if necessary by the discharger/producer when a new Order or Addendum is adopted by the Regional Board, and shall, at a minimum, contain the following provisions:
 - a. Provisions implementing Title 22, Division 4, Chapter 3, **Wastewater Reclamation Criteria**, of the California Code of Regulations;
 - b. Provisions implementing the State Department of Health Services (DOHS) **Guidelines For Use of Reclaimed Water and Guidelines for Use of Reclaimed Water for Construction Purposes** or measures, acceptable to DOHS, providing equivalent protection of public health;
 - c. Provisions authorizing the Regional Board, the discharger/producer, or an authorized representative of these parties, upon presentation of proper credentials, to inspect the facilities of any reclaimed water user to ascertain whether the user is complying with the discharger/producer's rules and regulations;
 - d. Provision for written notification, in a timely manner, to the discharger/producer by the reclaimed water user of any material change or proposed change in the character of the use of reclaimed water;
 - e. Provision for submission of a preconstruction report to the discharger/producer by the reclaimed water user in order to enable the discharger/producer to determine whether the user will be in compliance with the discharger/producer's rules and regulations;
 - f. Provision requiring reclaimed water users to designate a reclaimed water supervisor responsible for the reclaimed water system at each use area under the user's control. Reclaimed water supervisors should be responsible for the

installation, operation, and maintenance of the irrigation system, enforcement of the discharger/producer's reclaimed water user rules and regulations, prevention of potential hazards, and maintenance of the reclaimed water distribution system plans in "as built" form;

- g. Provision authorizing the discharger/producer to cease supplying reclaimed water to any person who uses, transports, or stores such water in violation of the discharger/producer's rules and regulations;
- h. Provision requiring notification and concurrence of the State Department of Health Services and the San Diego County Department of Health Services, Environmental Health Services for new reclaimed water users;
- i. Provision requiring all windblown spray and surface runoff of reclaimed water applied for irrigation onto property not owned or controlled by the discharger or reclaimed water user shall be prevented by implementation of best management practices;
- j. Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against erosion, overland runoff, and other impacts resulting from a 100-year frequency storm, 24 hour storm;
- k. Provision requiring all reclaimed water storage facilities owned and/or operated by reclaimed water users to be protected against 100 - year frequency peak stream flows as defined by the San Diego County flood control agency;
- l. Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against any reclaimed water user who discharges reclaimed water in violation of any applicable discharge prohibitions prescribed by the Regional Board or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050; and
- m. Provision for notification to reclaimed water users that the Regional Board may initiate enforcement action against the discharger/producer, which may result in the termination of the reclaimed water supply, if any person uses,

transports, or stores such water in violation of the discharger/producer's rules and regulations or in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code Section 13050.

The revised rules and regulations shall be subject to the approval of the Regional Board Executive Officer; the State Department of Health Services; and the San Diego County Department of Health Services, Environmental Health Services. The revised rules and regulations or a letter certifying that the discharger/producer's rules and regulations contain the updated provisions in the Order, shall be submitted to the Regional Board within 90 days of adoption of this Order by the Regional Board.

2. If the Vallecitos Water District (discharger/ producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall implement and enforce the approved rules and regulations for reclaimed water users. Use of reclaimed water by the discharger/producer shall be consistent with provisions a. through m. in item D.1 above. In addition, the discharger/producer shall submit an annual report certifying that the users have implemented the Rules and Regulations established by the discharger.
3. If the Vallecitos Water District (discharger/ producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, shall within 90 days of the adoption of this order, develop and submit to the Regional Board a program of Best Management Practices (BMP) for the reclaimed water users governing the irrigation practices, management and maintenance to avoid runoff, ponding, and overspray. The discharger/producer shall oversee that the reclaimed water users have implemented the BMP upon approval of the BMP program by the Regional Board Executive Officer.
4. If the Vallecitos Water District (discharger/ producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall, within 90 days of the adoption of this Order, develop and submit to the Regional Board a program to conduct compliance inspections of reclaimed water reuse sites to determine the status of compliance with the approved rules and regulations for reclaimed water users. The discharger/producer shall implement the inspection program upon

its approval by the Regional Board Executive Officer.

5. Reclaimed water shall not be supplied to parties who use, transport, or store such water in a manner which causes a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.
6. Prior to using reclaimed water or supplying reclaimed water for use by other parties in any manner or in any area other than as described in the findings of this Order, the discharger/producer shall obtain proper authorization from this Regional Board.

E. REPORTING REQUIREMENTS

1. The discharger shall file a new Report of Waste Discharge at least 120 days prior to the following:
 - (a) Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the wastes.
 - (b) Significant change in the treatment or disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste.)
 - (c) Change in the disposal area from that described in the findings of this Order.
 - (d) Increase in flow beyond that specified in this Order.
 - (e) Other circumstances which result in a material change in character, amount, or location of the waste discharge.
 - (f) Any planned change in the regulated facility or activity which may result in noncompliance with this Order.
2. The discharger shall furnish to the Executive Officer of this Regional Board, within a reasonable time, any information which the Executive Officer may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The discharger shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.
3. The discharger must notify the Executive Officer, in writing at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new discharger. The notice must include a written agreement between the existing and new discharger containing a specific date for the transfer of this Order's responsibility and coverage between the current discharger and the new discharger. This agreement shall include an acknowledgement that the existing discharger is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on.

4. The discharger shall comply with attached Monitoring and Reporting Program No. 93-23, and future revisions thereto as specified by the Executive Officer. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. 93-23.
5. If a need for a discharge bypass is known in advance, the discharger shall submit prior notice and, if at all possible, such notice shall be submitted at least 10 days prior to the date of the bypass.
6. Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information.
7. The discharger shall report any noncompliance which may endanger health or the environment. Any such information shall be provided orally to the Executive Officer within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the Executive Officer within 24 hours:
 - (a) Any bypass from any portion of the treatment facility.
 - (b) Any discharge of treated or untreated wastewater resulting from sewer line breaks, obstruction, surcharge or any other circumstances.
 - (c) Any treatment plant upset which causes the effluent limitations of this Order to be exceeded.
8. The discharger shall submit a facility operations manual within 90 days of the adoption of this Order.

9. All applications, reports, or information submitted to the Executive Officer shall be signed and certified as follows:
 - (a) The Report of Waste Discharge shall be signed as follows:
 - (1) For a corporation - by a principal executive officer of at least the level of vice-president.
 - (2) For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
 - (3) For a municipality, state, federal or other public agency - by either a principal executive officer or ranking elected official.
 - (b) All other reports required by this Order and other information required by the Executive Officer shall be signed by a person designated in paragraph (a) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if:
 - (1) The authorization is made in writing by a person described in paragraph (a) of this provision;
 - (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and
 - (3) The written authorization is submitted to the Executive Officer.
 - (c) Any person signing a document under this Section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of

Order No. 93-23

fine and imprisonment."

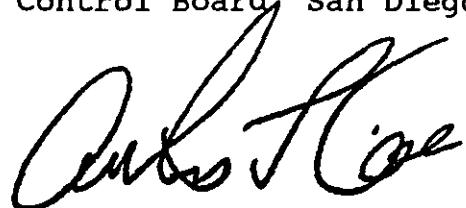
10. The discharger shall submit reports required under this Order, or other information required by the Executive Officer, to:

Executive Officer
California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd, Suite B
San Diego, California 92124-1331

F. NOTIFICATIONS

1. California Water Code Section 13263(g) states:
"No discharge of waste into waters of the State, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the State are privileges, not rights"
2. These requirements have not been officially reviewed by the United States Environmental Protection Agency and are not issued pursuant to Section 402 of the Clean Water Act.
3. The California Water Code provides that any person who intentionally or negligently violates any waste discharge requirements issued, reissued, or amended by this Regional Board is subject to a civil monetary remedy of up to 20 dollars per gallon of waste discharged or, if a cleanup and abatement order is issued, up to 15,000 dollars per day of violation or some combination thereof.
4. The California Water Code provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or falsifying any information provided in the monitoring reports is guilty of a misdemeanor.
5. This Order becomes effective on the date of adoption by the Regional Board.

I, Arthur L. Coe, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on March 15, 1993.



Arthur L. Coe
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

MONITORING AND REPORTING PROGRAM NO. 93-23
FOR THE
VALECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

A. MONITORING PROVISIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this Order and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Executive Officer.
2. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 5 percent from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration and operation of acceptable flow measurement devices can be obtained from the following references:
 - (a) "A Guide to Methods and Standards for the Measurement of Water Flow," U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD Catalog No. C13.10:421.)
 - (b) "Water Measurement Manual," U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington D.C. 20402. Order by Catalog No. 127,19/2:W29/2, Stock No. S/N 24003-0027.)

- (c) "Flow Measurement in Open Channels and Closed Conduits," U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS) Springfield, VA 22151. Order by NTIS No. PB-273-535/5ST.)
 - (d) "NPDES Compliance Sampling Manual," U.S. Environmental Protection Agency, Office of Water Enforcement. Publication MCD-51, 1977, 140 pp. (Available from the General Services Administration (8FFS), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225.)
- 3. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified in this Order.
 - 4. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
 - 5. Monitoring results must be reported on discharge monitoring report forms approved by the Executive Officer.
 - 6. If the discharger monitors any pollutants more frequently than required by this Order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the discharger's monitoring report. The increased frequency of monitoring shall also be reported.
 - 7. The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

8. Records of monitoring information shall include:
 - (a) The date, exact place, and time of sampling or measurements;
 - (b) The individual(s) who performed the sampling or measurements;
 - (c) The date(s) analyses were performed;
 - (d) The individual(s) who performed the analyses;
 - (e) The analytical techniques or method used; and
 - (f) The results of such analyses.
9. All monitoring instruments and devices which are used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.
10. The discharger shall report all instances of noncompliance not reported under Reporting Requirement E.7 of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Reporting Requirement E.7.
11. The monitoring reports shall be signed by an authorized person as required by Reporting Requirement E.9.
12. A composite sample is defined as a combination of at least eight sample aliquot of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24 hour period. For volatile pollutants, aliquot must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquot may be collected manually or automatically.
13. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.
14. Sampling and analysis shall, as a minimum, be conducted in accordance with Article 6 of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria).

B. EFFLUENT MONITORING

1. The Vallecitos Water District shall review the Meadowlark Water Reclamation Plant monitoring results for compliance with the following effluent limitations specified in Order No. 93-23 and submit a statement of compliance as part of Monitoring and Reporting Program No. 93-23. The statement of compliance shall identify and report all effluent limitation violations of Discharge Specifications No. B.1. of this Order. The following monitoring program shall constitute the effluent monitoring program for the Meadowlark Water Reclamation Plant specific to this Order:

Monitoring Program				
Determination	Unit	Sample Type	Sampling Frequency	Reporting Frequency
Flowrate	GPD	Continuous	Continuous	Monthly
Biochemical Oxygen Demand (5-day @ 20 C)	mg/l	Composite	3 times/week	Monthly
Total Suspended Solids	mg/l	Composite	3 times/week	Monthly
Volatile Suspended Solids	mg/l	Composite	3 times/week	Monthly
PH		Composite	3 times/week	Monthly
Total Dissolved Solids	mg/l	Composite	Monthly	Monthly
Chloride	mg/l	Composite	Monthly	Monthly
Adjusted Sodium Adsorption ratio		Composite	Monthly	Monthly
Electrical Conductivity	mmho/cm	Composite	Monthly	Monthly
Sulfate	mg/l	Composite	Monthly	Monthly
Iron	mg/l	Composite	Monthly	Monthly
Manganese	mg/l	Composite	Monthly	Monthly
Methylene Blue Active Substances	mg/l	Composite	Monthly	Monthly
Boron	mg/l	Composite	Monthly	Monthly
Fluoride	mg/l	Composite	Monthly	Monthly
Aluminium	mg/l	Composite	Annually	Annually
Arsenic	mg/l	Composite	Annually	Annually
Barium	mg/l	Composite	Annually	Annually
Cadmium	mg/l	Composite	Annually	Annually
Chromium	mg/l	Composite	Annually	Annually
Copper	mg/l	Composite	Annually	Annually
Lead	mg/l	Composite	Annually	Annually
Zinc	mg/l	Composite	Annually	Annually
Mercury	mg/l	Composite	Annually	Annually
Selenium	mg/l	Composite	Annually	Annually
Silver	mg/l	Composite	Annually	Annually
Coliform	MPN/ 100 ml	Grab	*	Monthly
Turbidity	NTU	Continuous	**	Monthly

* Samples for coliform bacteria shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures.

** Turbidity analysis shall be performed by a continuous recording turbidimeter.

Note: MGD = Million gallons per day
mg/l = milligrams per liter
NTU = Nephelometric Turbidity Units

mmho/cm = inverse of milliohms per centimeter
MPN/100 ml = milliliters per liter

2. The monitoring report shall indicate the flowrate and Title 22 levels being achieved in the effluent discharged for land disposal and/or reclamation from the Meadowlark Water Reclamation Plant. Flowrate reported in the monitoring report shall be representative of the flow discharged from the Title 22 treatment facility.

C. POTABLE SUPPLY WATERS

Analysis of the potable waters supplied to the service areas of the wastewater treatment facilities shall be conducted for the following constituent quarterly with the results reported monthly.

Constituent	unit
Total Dissolved Solids	mg/l
Chloride	mg/l
Sulfate	mg/l

D. SEWAGE SOLIDS

A log of the type, quantity, and manner of disposal and/or reuse of solids removed in the course of sewage treatment shall be maintained at the facility and made available to the Regional Board staff. In addition, the discharger shall submit a report, to the Regional Board annually, that certifies the sludge treatment process complies with all federal and state regulations.

E. RECLAIMED WATER USERS SUMMARY REPORT

If the Vallecitos Water District (discharger/producer) is supplying reclaimed water for use by parties other than the Carlsbad Municipal Water District, the discharger/producer shall submit an annual reclaimed water users summary report containing the following information:

a) Reclaimed water use site summary information

The following information shall be submitted for each reclaimed water use site.

- 1) Name of the reclaimed water use site

- 3) Address of the reclaimed water use site
- 4) Name of the reclaimed water use supervisor
- 5) Phone number of the reclaimed water use supervisor
- 6) Mailing address of the reclaimed water use supervisor, if different from site address
- 7) Basin Plan name and number of hydrologic subarea underlying the reclaimed water use site
- 8) Volume of reclaimed water delivered to the reclaimed water use site on a monthly basis.

b) Reclaimed water use summary information

- 1) Total volume of reclaimed water supplied to all reclaimed water users for each month of the reporting period.
- 2) Total number of reclaimed water use sites.

c) Reclaimed water use site inspections

Number of reclaimed water use site inspections conducted by discharger/producer staff and identification of sites inspected for the reporting period.

d) Reclaimed water user violations of the discharger/producer's rules and regulations

The discharger/producer shall identify all reclaimed water users known by the discharger/producer to be in violation of the discharger/producer's rules and regulations for reclaimed water users. The report shall include a description of the noncompliance and its cause, including the period of noncompliance, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

F. REPORTING

Monitoring reports shall be submitted to the Executive Officer in accordance with the following schedule:

<u>Reporting Frequency</u>	<u>Report Period</u>	<u>Report Due</u>
Monthly	January, February, March, April, May, June, July, August, September, October, November, December	By the 30 th day of the following month

Quarterly	January-March April-June July-September October-December	April 30 July 30 October 30 January 30
Semiannually	January-June July-December	July 30 January 30
Annually	January-December	January 30

Monitoring reports shall be submitted to:

California Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Suite B
San Diego, CA 92124-1331

Ordered by



Arthur L. Coe
Executive Officer
March 15, 1993

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM NO. 1 TO ORDER NO. 93-23

VALLECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

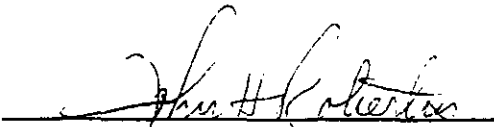
The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On March 15, 1993, this Regional Board adopted Order No. 93-23, *Waste Discharge Requirements for the Vallecitos Water District, Meadowlark Water Reclamation Plant, San Diego County*. Order No. 93-23 establishes requirements for the disposal of up to 2.0 million gallons per day (MGD) of tertiary treated effluent to be used for irrigation at the La Costa Hotel & Spa and the Aviara Master Association.
2. On April 16, 1996, the Vallecitos Water District submitted a report of waste discharge applying for an increase in the rated capacity of the Meadowlark Water Reclamation Facility from 2.0 MGD to 2.25 MGD. The report documents that 250,000 gallons per day of additional capacity is available with minor operational changes of the feed pattern to the rotating biological contactors (RBC's).
3. The Regional Board has notified all known interested parties of its intent to modify Order No. 93-23 to reflect an increase in the rated capacity of the Meadowlark Water Reclamation Facility from 2.0 MGD to 2.25 MGD.
4. The Regional Board in a public hearing heard and considered all comments pertaining to the modification of Order No. 93-23.
5. On August 21, 1996 the Vallecitos Water District approved a Negative Declaration for this project pursuant to the provisions of the California Environmental Quality Act (CEQA). The project as approved by the Vallecitos Water District will not have a significant impact on the environment.

IT IS HEREBY ORDER THAT ORDER NO. 93-23 BE AMENDED AS FOLLOWS:

1. Prohibition A.5 has been changed to:
 5. A maximum flowrate from the Meadowlark Water Reclamation Facility in excess of 2.25 MGD is prohibited unless the discharger obtains revised waste discharge requirements for the proposed increased flow.

I, John H. Robertus, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, on November 14, 1996.



JOHN H. ROBERTUS
Executive Officer

Appendix E

Existing Water Reclamation Plant Design Criteria and Process Schematics

Table E-4 Shadowridge WRP Design Summary Buena Sanitation District	
Item	Criteria
Peak Dry Weather Flow (PDWF) Peak Wet Weather Flow (PWWF) Design BOD ₅ Design Suspended Solids	1.8 mgd 2.5 mgd 200 mg/l 250 mg/l
<u>Influent Screening</u> Number Type Capacity	3 Rotary 900 gpm
<u>Grit Chamber</u> Number Type Length Width Water Depth Volume Minimum Detention Time	1 Aerated 15 feet 9 feet 6 feet 6,060 gal 3.5 min
<u>Rotating Biological Contractors</u> Number of Shafts Diameter Surface Area/Shaft Organic Loading First Shaft Overall Hydraulic Loading (Overall)	5 11'-10" No. 1 130,000 sf Nos. 2-5 156,000 sf 12.59 lbs BOD ₅ /1,000 ft ² /day 2.74 lbs BOD ₅ /1,000 ft ² /day 1.82 gal/ft ² /day
<u>Sedimentation Tanks</u> Number Type Length Width Water Depth Volume Per Tank Detention Time (ADWF)	2 Rectangular 110 ft 10 ft 8.5 ft 70,000 gal 3.08 hours

<u>Holding/Flow Eq. Tank</u>	
Number	1
Diameter	56 ft
Water Depth	15 ft
Volume	275,000 gal
<u>Insert Media Filter</u>	
Number	2
Type	Hi-rate Horizontal
Media	Coal (anthracite) - sand
Diameter	9 ft
Length	17'-0"
Surface Area	160 ft ²
Maximum Working Pressure	60 psig
Hydraulic Loading	5 gpm/ft ²
Backwash Rate	15 gpm/ft ²
Backwash Duration	6-8 min
<u>Chlorine System</u>	
Number	3
Type	Gas Vacuum
Capacity	
Effluent	2 @ 500 PPD w/200 PPD flow meters
Influent	1 @ 100 PPD
Effluent Dosage	
@ Ultimate PWWF	
PWWF	2.5 mgd
Maximum Dose	200 lb/mil gal
<u>Chlorine Contact Tank</u>	
Number	1
Length	110 ft
Width (Overall)	24 ft
Water Depth	5.5 ft
Volume	108,610 gal
Contact Time @ 800 gpm	2.25 hours

Table E-3 Gafner Water Reclamation Facility Design Data
Leucadia County Water District

Item	Criteria
Average Dry Weather Flow (ADWF) Peak Daily Flow (PDF) BOD ₅ ¹ Total Suspended Solids ¹	0.75 mgd 1.50 mgd 240 mg/l 270 mg/l
<u>Primary Clarifier</u> Dimensions Surface Area Volume Detention Time @ ADWF Detention Time @ PDF Weir Length Weir Overflow	35 ft diameter x 9 ft depth 962 sq ft 66,000 gal 2 hours 1 hour 110 ft 6.818 gal/ft/day
<u>Trickling Filter</u> Dimensions Surface Area Media Depth Volume Media Type Organic Loading @ ADWF	65 ft diameter x 6 ft depth 2,826 sq ft, .064 acre 5.3 ft 125,000 gal standard density plastic 56 lb/1,000 cf/day
<u>Secondary Clarifier</u> Dimensions Surface Area Volume Detention Time @ ADWF Detention Time @ PDF	35 ft diameter x 9 ft depth 962 sq ft 66,000 gal 2 hours 1 hour
<u>Sludge Digester (not in use)</u> Diameter Volume	40 ft 243,000 gal
<u>On-Site Storage</u> Volume	800,000 gal
<u>Rapid Mix</u> Type Number	Mechanical Mixer 1
<u>Flocculation-Clarification</u> Type Number Reactor Detention Time Clarifier Loading Rate	Densadeg High Rate 1 15 min 10,000 gpd/sf

<u>Filtration</u> Type Number Surface Area, Each <u>Design Loading Rate</u> 4 Filters 3 Filters	Parkson DynaSand 4 50 sf 3.8 gpm/sf 5.0 gpm/sf
<u>Chlorine Mix</u> Type Number	Mechanical Mixer 1
<u>Chlorine Contact Tank</u> Detention Time Min. L to W/D Ratio	120 min 40:1
<u>Reclamation Water Pumping (Existing)</u> Number Type Size Capacity	2 (duty/standby) vertical Turbine 40 hp 1,125 gpm
<u>Chemical Storage and Handling</u> Chlorine Form Storage Tank Volume Alum Storage Tank Volume Pump Capacity Polymer Storage Drum Volume Feed Package Capacity	sodium hypochlorite 12,000 gal 6,000 gal 8 gph 2 x 55 gal 1 gph
¹ Based on 1991 influent data.	

Table E-2 Meadowlark WRF Design Summary Vallecitos Water District	
Item	Criteria
Design Flow Design BOD ₅ Design Suspended Solids	2.0 mgd, average; 3.6 mgd, peak 250 mg/l 250 mg/l
<u>Influent Screens</u> Type Number Capacity	Rotary Screens with .020 Inch Openings 3 screens, including one standby 1,700 gpm
<u>Rotating Biological Contractors</u> Design BOD ₅ /Influent Design BOD ₅ /Effluent Number of Shafts Diameter Organic Loading Hydraulic Loading	225 mg/l 30 mg/l 8 11'-10" 4.17 lbs BOD ₅ /1,000 ft ² /day 2.0 gal/ft ² /day
<u>Sedimentation Tanks</u> Overflow Rate Number Tank Dimensions	600 gpd/ft gal/ft ² average 3 tanks, including one standby 15 ft wide x 110 ft long x 7 ft average water depth
<u>Chemical Feed System</u> Alum and Polymer Dosage	80 mg/l
<u>Filters</u> Dual Media Filtration Rate Automatic Backwash Number	Anthracite and sand 5 gpm/ft ² at peak flow 20-25 gpm/ft ² , water 3 filters, including one standby
<u>Chlorination</u> Type 3 Chlorinators, Including One Standby Capacity	Storage for 6 Ton Cylinder with Automatic Switchover (2) 500 lb/day (1) 250 lb/day
<u>Chlorine Contact Tanks</u> Volume Detention time Number	390,700 gal 5.1 hrs @ ADWF 1

<u>Effluent Pumping</u> Location Capacity	Effluent Pumps Mounted in Chlorine Contact Tanks (1) 1,389 gpm @ 315 ft TDH (2) 1,200 gpm @ 161 ft TDH
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Table E-1 Phase IV Design Criteria
Encina Water Pollution Control Facility

Item	Unit	Existing	Phase IV
DESIGN YEAR	Yr.	1990	2010
LOADINGS:			
Flow			
Average Dry Weather Flow (ADWF)	mgd	22.5	36.0
Peak Dry Weather Flow (PDWF) mgd	mgd	34.4	68.4
Peak Dry Weather Flow (PWWF)			
2.0 Peaking Factor	mgd	45.0	72.0
2.5 Peaking Factor	mgd	56.3	90.0
Reclamation Plant Flows	mgd	2.0	2.0
Maximum Hydraulic Flow Capacity	mgd	115	115
BOD	mg/L	217	211
	ppd	40,974	69,914
I. PRELIMINARY TREATMENT			
Metering			
Type	-	Parshall Flume	Parshall Flume
No. Of Units	Ea.	2	2
Throat Width, each	In.	1 @ 12	1 @ 12
Bar Screens			
Type	-	Climber	Climber
No. Of Units	Ea.	3	4
Channel Width	Ft.	4	4
Bar Size	In.	3/8	3/8
Clear Width	In.	3/4	3/4
Peak Hydraulic Capacity, Each	mgd	30.3	30.3
Total Hydraulic Capacity, One Units of Standby	mgd	60.6	90.9
Screening Conveyor			
Number	Ea.	1	1

Grit Chambers				
Type	-	Aerated	Aerated	
No. Of Units	Ea.	2	3	
Length	Ft.	35.0	35.0	
Width Ft.	Ft.	24.0	24.0	
Depth at Top of Grit Hopper	Ft.	17.25	17.25	
Volume, Each	1,000 gal	100.6	100.6	
Detention Time at PWWF, with 2.0 Peak Factor	Min.	6.4	6.0	
Grit Pumps				
Type	-	Recessed Impeller	Recessed Impeller	
Number	Ea	4	6	
Capacity, each	gpm	250	250	
II. <u>PRIMARY TREATMENT</u>				
Primary Clarifiers				
Type	-	Rect.	Rect.	
No. Of Units	Ea	6	10	
Length	Ft	160	160	
Width	Ft	20	20	
Depth (Average)	Ft	9	9	
Surface Area, each	sf	3,200	3,200	
Volume, each	1,000 gal	215.4	215.4	
Length of Weir, each	Ft	160	160	
Overflow Rate at ADWF	gpd/sf	1,172	1,125	
Overflow Rate at ADWF, One Tank Out of Service	gpd/sf	1,406	1,250	
Detention Time at ADWF	Hr	1.38	1.44	
Detention Time at ADWF, One Tank Out of Service	Hr	1.15	1.30	
Nominal Capacity, each	mgd	3.75	3.60	
Maximum Hydraulic Capacity, each	mgd	10.5	10.5	
Assumed Primary Treatment Efficiency				
BOD Removal	%	35	35	
SS Removal	%	65	65	

Primary Sludge Concentration, Avg	%	5.5	5.5
Primary Sludge VSS Ratio	%	80	80
Primary Sludge Pumps			
Type	-	Prog Cav	Prog Cav
Number	Ea	6	10
Capacity, each	gpm	125	125
Primary Scum Pumps			
Type	-	Prog Cav	Prog Cav
Number	Ea	2	2
Capacity, Each	gpm	150	150
III. <u>ACTIVATED SLUDGE</u>			
Aerated Basins			
No. Of Units	Ea	2	3 ⁽¹⁾
Passes per Tank	Ea	2	2
Length per Pass	Ft	298	298
Width per Pass	Ft	35	35
Depth	Ft	15	15
Volume, Each	1,000 cf	312.8	312.8
Diffusers per Basin	Ea	6,516	6,516
RAS Flow as Percent of Q			
Average	%	50	50
Maximum (All Secondary Clarifiers in service)	%	80	87
Detention Time at ADWF	Hr	5.00	4.68
BOD Loading	ppd/1,000 cf	44.4	46.0
BOD Loading, One Unit	ppd/1,000 cf	88.7	68.9
Out of Service			
Mean Cell Residence Time	Days	4.0	4.3
Assumed MLSS Concentration	mg/L	1,372	1,372
MLSS VSS Ratio	%	77	77
F/M Ratio	lb/BOD/ lb/MLSS/ day	0.50	0.51
Aeration Blowers			
No. Of Units	Ea	3	4

Capacity, each	scfm	10,000	10,000
No. of Engine Driven Units	Ea	2 ⁽²⁾	22
No. Of Motor Driven Units	Ea	1	2
Air Requirements at 1.0 lb O per lb BOD Removed	cfm	14,670 ⁽³⁾	22,841
Secondary Sedimentation Tanks			
Type	-	--Circular, Rapid Draw-Off--	
No. Of Units	Ea	4	7 ⁽¹⁾
Diameter	Ft	105	105
Sidewater Depth	Ft	20	20
Net Surface Area, each	sf	8,659	8,659
Volume, each	1,000 cf	173.2	173.2
Length of Weir, each	Ft	503	503
Overflow Rate at ADWF	gpd/sf	650	594
Overflow Rate at PDWF, one Tank out of service	gpd/sf	1,324	1,316
Detention Time at ADWF	Hr	5.53	6.04
Assumed RAS/WAS Concentration	mg/L	3,500	3,500
RAS/WAS VSS Ratio	%	77	77
Secondary Sludge Pumps			
RAS Pumps			
Type	-	Cent.	Cent.
Number	Ea	4	7
Capacity, each	gpm	400-3,200	400-3,200
WAS Pumps			
Type	-	Cent.	Cent.
Number	Ea	3	4
Capacity, each	gpm	100-440	100-600
Secondary Scum Pumps			
Type	-	Prog Cav	Prog Cav
Number	Ea	2	2
Capacity, each	gpm	25	25
IV. <u>EFFLUENT DISPOSAL</u>			

Effluent Pumping				
No. Of Units	Ea	3 ⁽⁴⁾		4
Total Pumping Capacity, with 1 stand-by-pump at Highest Recorded Tide	mgd	58.0		58.0
Ocean Outfall				
Diameter	In	48/72		48/72
Length	Ft	7,800		7,800
Avg. Discharge Depth at Diffuser	Ft	150		150
Capacity, @ Highest Record Tide	Mgd	58.0		58.0
Effluent Equalization Storage				
Process Volume Available	mgal	-0-		3.5 ⁽⁵⁾
Volume Required at:				
2.0 Peaking Factor	mgal	-0-		1.0
2.5 Peaking Factor	mgal	-0-		7.0
Primary Effluent Equal, Pumps				
Type	-	-		Submer.
Number	Ea	-0-		2
Capacity, each	gpm	-		3,000
Secondary Effluent Equal, Pumps				
Type	-	-		Submer.
Number	Ea	-0-		2
Capacity, each	gpm	-		3,000
Expected Effluent Quality				
BOD mg/L	30	30		
Suspended Solids	mg/L	30		30
V. <u>SOLIDS HANDLING</u>				
DAF Thickeners				
No. Of Units	Ea	2		3
Diameter	Ft	40		40
Sidewater Depth	Ft	10		10
Area, each	sf	1,250		1,250

Surface Loading Rate at ADWF, with One Unit Out of Service	lb/sf/hr	0.93	0.72
Assumed Solids Capture	%	95	95
Assumed Thickened WAS Concentration with Polymer Addition	%	4.0	4.0
DAF Thickener Pumps			
Pressurization Pumps			
Type	-	Vert Turb	Vert Turb
Number	Ea	3	5
Capacity, each	gpm	475/675	475/675 ⁽⁶⁾
TWAS Pumps			
Type	-	Prog Cav	Prog Cav
Number	Ea	2	4
Capacity, each	gpm	225	225
Anaerobic Digesters			
Units No. 1 through 3			
Number	Ea	3	3
Diameter	Ft	50	50
Sidewater Depth	Ft	22	22
Volume, each	1,000 cf	42.2	42.2
Unit No. 4			
Number	Ea	3	3
Diameter	Ft	105	105
Sidewater Depth	Ft	35	35
Volume, each	1,000 cf	274.0	274.0
VSS Loading (Clean)	ppd/cf		
VSS Loading (Clean) with One Large Unit Out of Service	ppd/		
Hydraulic Detention Time (Clean)			
Hydraulic Detention Time (Clean) with One Large Unit Out of Service			
Assumed Average VSS Removal			
Assumed Average Digester			

Gas Production			
Digester Pumps/Compressors			
Gas Mixing Compressors (Dig. Nos. 1-4)			
Type			
Number			
Capacity, each	-	P.D. Lobe	P.D. Lobe
Number	Ea	3	3
Capacity, each	scfm	360	360
Number	Ea	1	1
Capacity, each	scfm	1,400	1,400
Digester Mixing Pumps (Dig. Nos. 5&6)			
Type	-	-	Screw Centr.
Number	Ea	-0-	4
Capacity, each	gpm	-	6,000
Heated Sludge Recirc. Pumps			
Type	-	Rec Imp	Rec Imp
Number	Ea	3	3
Capacity, each	gpm	500	500
Number	Ea	1	3
Capacity, each	gpm	650	650
Hot Water Circulating Pumps			
Type	-	Centr.	Centr.
Number	Ea	3	3
Capacity, each	gpm	80	80
Number	Ea	1	3
Capacity, each	gpm	500	500
Digested Sludge Pumps			
Type	-	P.D. Lobe	P.D. Lobe
Number	Ea	4	2
Capacity, each	gpm	175	175
Type	-	Prog. Cav.	Prog. Cav.
Number	Ea	-0-	6
Capacity, each	gpm	-0-	150

Belt Filter Presses

Units No. 1 through 4

No. Of Units	Ea	4	4
Nominal Size, Each	Meters	2	2
Capacity, Each	gpm	120	120
Assumed Solids Capture	%	90-98	90-98
Assumed Dewatered Solids Concentration	%	15.2	15.2
Assumed Average Wash Water Usage per Belt Press	gpm	120	120

VI. POWER GENERATION

No. Of Units	Ea	3	3
Capacity, each	Kw	475	475

VII. DISINFECTION (FOR ON-SITE RECLAMATION)

Chlorine Contact Basin

No. Of Units	Ea	2	2
Passes per Tank	Ea	3	3
Length	Ft	44	44
Width per Pass	Ft	3.54	3.54
Depth	Ft	15.5	15.5
Volume, Each	1,000 cf	7.24	7.24

Chlorination Equipment

Evaporators

No. Of Units	Ea	4	4
Capacity	ppd	8,000	8,000

Chlorinators

No. Of Units	Ea	1	1
Capacity			
Prechlorination 1	ppd	8,000	8,000
Prechlorination 2	ppd	2,000	2,000
Return Activated Sludge	ppd	2,000	2,000
No. 3 Water	ppd	500	500

Injectors

No. Of Units	Ea	4	4
Capacity			
Prechlorination 1	ppd	3,000	3,000
Prechlorination 2	ppd	2,000	2,000
Return Activated Sludge	ppd	2,000	2,000
No. 3 Water	ppd	500	500

VIII. TANK DRAINAGE SYSTEMS

Grit/Primary Drainage Pumps

Type	-	Self Prim	Self Prim
Number	Ea	2	2
Capacity, Each	gpm	450	450

Aeration/Secondary Drainage Pumps

Type	-	Centr.	Centr.
Number	Ea	2	2
Capacity, Each	gpm	360	360

- (1) The 4th aeration basin and 8th secondary clarifier are to be constructed during the Phase IV Expansion and are to be utilized for effluent equalization storage until they are required for process treatment.
- (2) Due to current APCD permit limitations only 1 engine driven blower can be operated on digester gas at any time.
- (3) Currently operating in the range of air requirements between 0.5 to 0.7 lb O per lb BOD removed.
- (4) Effluent Pump No. 3 is scheduled to be installed prior to the beginning of phase IV as an interim project.
- (5) The 7th secondary clarifier volume of 1.3 mgd will also be available until approximately the year 1998.
- (6) Pressurization Pump Nos. 4-6 to be single speed 675 gpm only.

RECLAIMED WATER MASTER PLAN REFERENCES

1. "City of Carlsbad Water Reclamation Master Plan", Dudek and Associates, Inc., August 1990.
2. "North County Water Reclaimed Project-Phase II Master Plan", Camp Dresser & McKee, June 1996.
3. "Final Project Summary Report, Water Reclamation Loan Program, Carlsbad Municipal Water District, Encina Basin Project-Phase I", Carlsbad Municipal Water District, March 1995.
4. "Second Annual Progress Report, Water Reclamation Loan Program, Carlsbad Municipal Water District, Encina Basin Project-Phase I", Carlsbad Municipal Water District, February 1996.
5. "Draft TDS Alternative Analysis", Encina Wastewater Authority, January 1996.
6. "Vallecitos Water District Final Water, Wastewater and Reclamation Master Plan", John S. Murk Engineers, Inc., July 1991.
7. "Encina Water Pollution Control Facility 2020 Facility Plan Update", John Carollo Engineers, February 1993.
8. "Encina Wastewater Authority Ocean Outfall Disposal Capacity", Carollo Engineers, February 1996.
9. "Preliminary Site Evaluation," HYA Consulting Engineers, March 1994.